

FRIDAY, OCT. 3.

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Contributions.

A Lesson from a Wreck.

ASHEVILLE, N. C., Sept. 19, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Richmond & Danville Railroad crosses the Yadkin River about seven miles east of Salisbury, N. C., on a Post patent combination bridge. There are four spans of 100 ft. each; the top chord, braces and counters are of wood, the lower chord of iron.

On the afternoon of Sept. 6, as freight train No. 19, going east, was approaching this bridge, some part of the engine gave way, and it became unmanageable to such an extent as to be unable to control the heavy train. The broken part of the locomotive dropped down between the ties, tearing them out of position; in consequence several cars became derailed. These in turn completed the work of destruction by breaking up and completely destroying two spans of the bridge, the whole going down into 12 ft. of water, some 60 ft. below grade.

By four o'clock next morning Capt. W. H. Green, General Superintendent of the Richmond & Danville system was on the ground in person, and collected the necessary material, equipment and men to repair the break. By 12:45 p. m. on Friday, Sept. 12, not quite six days, the break had been repaired, trains were running and business had resumed its normal channel.

To fully appreciate the celerity with which this work was carried on, one must remember that an engine and 36 cars, filled with all kinds of merchandise, crushed and broken, mixed with bridge rods and timbers, and all tied together by telegraph wires, bridge rods and lower chords, had first to be removed; then a trestle 320 ft. long and 60 ft. high had to be built across a deep and rapid river, requiring more than 1,000 ft. of timber.

I find lessons in the result for the public as well as for the railroader. To the latter it shows the value of the system, discipline and *esprit de corps*. To the former it emphasizes a truth that is ever disputed, viz., that a combination of many roads into one large system is better for the country than an aggregation of small independent lines. If this accident had happened when this branch was an independent line, the company would have been three months in repairing the breach; in the first place, they could not have controlled more than 10 per cent. of the number of men and the material that Captain Green drew from 12 or 15 different roads; they would have been proportionally longer in clearing the débris and repairing the breach, but still longer for want of the ready money that a great system controls. In six days the business of the country did not suffer any material loss, but in three months, during the height of the cotton season, the loss all along that line would be simply incalculable; and yet the people most interested are decrying consolidation.

B.

Floating Bridges into Position.

LONDON, Sept. 19, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In correcting my description of the Saltash Bridge, Mr. Hannaford refers to the trusses having been lowered into place, not raised up from below. This, I believe, was so, but it had escaped my memory, the floating stage being very high.

As to floating trusses into place, this is by no means new, for not only were the Saltash trusses so floated, but also the tubes of the Conway and Menai Straits (Britannia) bridges all of which tubes were built on shore and floated out and then raised into position. The Admiralty, I believe, specially insisted upon such freedom of navigation through the Menai Straits that, apart from other considerations, floating the tubes was best fitted to avoid obstruction.

When one compares the design of the rectangular tube

with Brunel's structure, it cannot but be regretted that so entirely a utilitarian design won the day at Menai. The view up and down the straits from the bridge is one of the finest pieces of railroad scenery in England, and yet is lost to passengers in the square, dark tube, whereas the splendid view from Brunel's bridge at Saltash, is worth the journey to see. Few Americans get so far west as Plymouth, and yet it is but six hours' journey from London, and well worth while seeing this fine example of pinned truss, up to within a few years the longest two pin trusses existent.

A bit of ancient history in iron bridge building has just been done away with. I refer to the once famous Newark Dyke, Warren girder bridge, which carried the Great Northern Railway over the navigable cut of the River Trent, near Newark. As originally constructed, this bridge was of four girders, being, in fact, a pair of single-track bridges upon skew abutments. The span was large at the time—nearly 40 years ago—namely, 240 $\frac{1}{2}$ ft. The truss depth was only 17 ft., and the upper chord an octagonal tube of cast iron from 13 $\frac{1}{2}$ to 18 in. diameter. The lower chord was of wrought-iron pin links, 18 $\frac{1}{2}$ ft. centre to centre of pin holes, and 9 in. wide by $\frac{3}{4}$ in. and 1 in. thick. The end pins were 5 $\frac{1}{2}$ in. diameter, and the struts alternate, of cast and wrought iron. There was horizontal wind bracing, both between top and bottom chords, but no sway bracing. I never saw this structure at close quarters, but have heard somewhere that it was at one time much re-enforced. It is now wholly gone, and its place taken by a pair of single-track bridges on the same abutments of the arched top, lattice, riveted type, very similar in appearance to the larger double-track bridge at Kuilenberg, in Holland, of 492 ft. span.

The new bridge at Newark is a good type of the best riveted work of to-day, and it is a fine sight to see a G. N. express rush across at full speed by night, the network of overhead bracing lighted up by the open fire door. One cannot avoid thinking how utterly inadequate present day electric motive power is to the performance of the daily work of the despised and self-contained locomotive. I may add that on both occasions, when I crossed the bridge at Kuilenberg, speed was very much reduced. Why this was done I could not understand. The bridge was strong enough apparently, and I could only think it due to special caution, which is never exercised in England in respect to any bridge other than such as are under repair. W. H. BOOTH.

The St. Clair Tunnel.

In our account of this work published last week we omitted to say that it was not let out by contract, but was done by the company on a cash basis, and with funds provided from the general resources of the Grand Trunk Company.

We described the permanent drainage plant supplied by Henry R. Worthington. We are informed that the tunnel is practically dry, and the pumps which were made for its drainage are not required for that purpose. These, which have a daily capacity of 5,000,000 imperial gallons, will be used for the removal of the rainfall and surface drainage from the open cutting at the Canadian end of the tunnel, and will, during severe thunder storms, have to work up to their full duty. A battery of six Worthington pumps (which are now on the ground), having an aggregate capacity of 3,000 gallons per minute, will remove the water from the open cutting at the American end of the work.

Tests of the Chicago Vertical Plane Coupler.

On Friday of last week a party of railroad men and representatives of stock car companies visited the Chicago & Northwestern shops in Chicago to see the tests of the Chicago vertical plane car coupler. This coupler has been under development for the past three months, and during that time several forms of the general design have been thoroughly tested and necessary changes made to put it into commercial shape.

It is made in two forms, of malleable iron and cast steel. The cast steel coupler is about 35 lbs. lighter than the malleable iron one. The object of these tests was to determine the comparative strength of the malleable iron and the steel coupler; and the efficiency of the new draft rigging used on the Chicago & Northwestern freight cars, invented by Mr. C. A. Schroyer, of the Car Department, was tested at the same time, as both cars were fitted with this rigging.

The first test was made with two cars fully loaded with car wheels, one fitted with the malleable iron and the other with the steel coupler. They were first run together at a speed of 15 miles per hour, with the knuckles open, to determine the coupling action at high velocities. The knuckles were then closed and the cars run together at a speed of between 25 and 30 miles per hour. The shock was sufficient to move the load of wheels several feet and throw some of them through the ends of the cars. Under this blow the malleable iron drawhead broke. The guard arm was knocked off in the usual way, as illustrated recently in the *Railroad Gazette*. (See issue of June 6, 1890, page 395.) A careful examination of the steel coupler showed that it had suffered no damage whatever. The shock was sufficient to smash the trucks and render the cars unfit for further tests until another set of trucks had been secured.

The party then went to the testing room, where a steel coupler was mounted in a testing machine. The strain was gradually increased until it reached 100,000 lbs., when the link—the standard of the Chicago & Northwestern road—broke. Then a steel link of special form was substituted and the strain increased to 122,000 lbs. At this point the steel pivot pin bent outward under the strain, but the cast steel of the coupler was not cracked. It was the opinion of those present that by using a larger pin the steel casting would have withstood 170,000 lbs. without fracture. However, with the small pivot pin, the coupler was thought sufficiently strong, as the demand for a link is but 95,000 lbs.

After a thorough discussion of this test, the party returned to the testing tracks, where the cars, which had been fitted with new trucks, were again run together at a speed of 30 miles per hour, which badly broke the trucks and drove the carloads toward the end of the cars. No damage was done to either coupler by this impact, which was almost entirely taken by the guard arm of the steel coupler and by the knuckle and pivot of the malleable iron one. A close scrutiny revealed no cracks in the steel coupler, and showed the value of the peculiar form of the Chicago knuckle to resist a blow. It is arranged in such a way that the knuckle strikes against a projection on the interior of the head, and the marks of the heavy blow at that point were distinctly visible.

After each test the drawbar attachments were thoroughly examined, and after the cars had been demolished these attachments were found to be in the same condition as before the tests. They were not even started out of position. This drawbar attachment was illustrated in the *Railroad Gazette* Nov. 1, 1889, page 708, and has been placed on a large number of cars on the Chicago & Northwestern road, and is being put on in all repairs and new equipment.

The visitors present were much impressed with the strength of the steel coupler in proportion to its weight, it being over 30 lbs. lighter than the malleable iron drawbar, and yet so much stronger that it was not in the least damaged, while the other was badly damaged.

These tests complete the development of this coupler, and the new company is now ready for business. The steel coupler will be sold for the price at which the ordinary coupler of malleable iron is sold, with a guarantee of a strength over double that of any coupler now in the market. It is, of course, an advantage to have a light coupler, principally because it materially facilitates repairs. This can be secured by furnishing a superior quality of material, and by doing this the Chicago Railway Appliance Company expects to be able to meet the demand for stronger couplers.

A word should be said with regard to the quality of the steel used. The castings were made by the Chicago Tire & Spring Co. after a new process, and the material is the same quality that is used in locomotive tires. Its tensile strength is about 70,000 lbs., and its ductility is very great, repeated bendings failing to make a fracture. This coupler is already adopted by the Chicago & Northwestern Railway as a standard, and by several Western roads. It is also exclusively used by the Street Stock Car line and other stock car companies.

The Sykes Block Signal Apparatus.

What is known as the "Sykes System" is the application to an ordinary manual block system of certain electrical-and mechanical devices which insure that the signal governing the entrance to a given block cannot be cleared until the last train which entered that block has passed out of it, and the operator at the end of the block has given his consent.

Under the practice of The Union Switch & Signal Co., which has proprietary control of the Sykes system for this country, these results are secured by the use of a Sykes lock instrument, an interlocking relay, and a short insulated section of track, with proper metallic circuits connecting these. Also, a bell wire, or telegraph line, for communicating between adjacent block stations.

The Sykes lock instrument is placed in the operator's office immediately over the lever by which he controls his signal. The interlocking relay is located in any convenient place, usually in a closet. The insulated section of track is located at the entrance of the block, and is usually two rails in length (about 60 ft.). The bell wire push buttons are placed near the signal lever and the Sykes instrument.

The connection and relative operation of the signal lever and the Sykes lock instrument are illustrated by figs. 1 and 2, which show two operating levers and two lock instruments, the regular equipment of a block station working blocks in both directions.

The important connections are the lock bolt, the lock bar, the lock rod, and the plunger rod. Normally, the signal lever being home, and the signal at danger, the lock bolt is entered in a hole in the lock bar, and both plunger rod and lock rod are in their extreme upward positions, displaying the words "Clear" and "Locked" (fig. 1), which indicate to the operator that the plunger is free to be worked (and thus unlock a signal lever at an adjacent block station), but that his own signal lever is locked and cannot be moved.

The operation in practice is as follows, everything being normal, levers home, signals at danger, and tracks

unoccupied: If the operator desires to allow a train to enter one of the blocks which his signals control, he notifies the operator next in advance (by bell wire or telegraph line); the advance operator, if everything is all right, responds by "plunging" on one of his instruments. That has the effect of releasing the lock rod at the first station; the lock rod falls by its own weight, and in so doing withdraws the lock bolt from the lock bar. The operator then pulls over his lever and clears his signal; this movement forces the lock bar forward, and, through the action of the inclined plane and roller, also forces the lock rod upward to its normal position, where it is automatically held until again released by the operator at the station in advance; this upward movement of the lock rod leaves the lock bolt free to be sprung into the hole in the lock bar, when the lever is again returned to its normal position.

The only function of the Sykes system so far alluded to is that by which the operator, on request of an adjacent operator, may "plunge" and thus release the latter's signal lever. The additional and important function of the combined apparatus is to prevent an operator from plunging a second time until the train for which the preceding operator desired to clear his signal has passed into, through, and out of the block in question. This result is secured by the combined action of the Sykes instrument, the interlocking relay and the insulated section of track.

The Sykes instrument is shown in position and in connection with the operating signal levers in figs. 1 and 2, as above referred to. It is shown in detail in figs. 3, 4, 5, 6 and 7.

Fig. 3 exposes those parts which are employed in unlocking the signal lever. When an adjacent operator plunges he simply passes a current through the electro-magnets 21 of his neighbor's instrument, thus attracting and raising armature 22, and imparting a slight rotation to balanced lever 23 about its centre 24. This releases trip 25 (which then is free to rotate about its centre 26) and permits the lock rod 35 to drop by its own weight, and thus unlock the operator's signal lever as explained in connection with fig. 2.

Fig. 5 best illustrates the action and results of plunging. When plunger 27 is pushed in, cross-bar 28 (figs. 5 and 6) is raised, breaking one circuit and completing another by means of springs at 29 (figs. 3 and 6). When plunger 27 is forced out to its original position by the action of spring 30, an electrical contact is effected by springs, at 31 (figs. 5 and 6). One end of cross-bar 28 is free to rotate, in one direction only, about 90 degrees, but is restored to its original position by a small contained spiral spring; thus, in fig. 5, the small projection on left of cross-bar 28 causes it to revolve on the upward stroke, and no contact at 31 is effected. But on the downward stroke the same projection presses the flat springs to the left and effects the desired contact. In order that this contact may not be too brief (an electro-magnet at adjacent station is thereby charged) the downward stroke of cross-bar 28 is retarded by dash pot 32, which has a small vent hole below.

In plunging there is also an important mechanical interaction between plunger rod 33 and trip rod 34 (figs. 4, 5 and 7). Plunger rod 33 has attached to it a pin 36 (figs. 4 and 5). Plunger 27 has attached to it a side piece 37 (figs. 4, 5 and 7). Trip rod 34 has attached to it a pawl piece 38 and a sliding block 39 (figs. 4, 5 and 7). Normally, as shown in fig. 2, the plunger rod is in its extreme upper position. In this position, as shown in fig. 5, the plunger rod 33, by means of pin 36, supports pawl piece 38 and the trip rod 34, thus displaying the word "Clear" (fig. 4) to the operator, which signifies that his plunger is free or clear, and may be operated in response to request from adjacent operator.

When the plunger 27 is pushed in, the side piece 37 forces pawl piece 38 off from pin 36 and trip rod 34 drops; at the same time sliding block 39, previously supported by the pressure of pawl piece 38, drops until it rests on side piece 37, which is then under it. When the plunger comes out, on its return stroke, sliding block 39 falls still farther on to the extension or foot of side piece 37, preventing the plunger 27 from being again forced in. When the trip rod 34 dropped, the word "Blocked" was displayed instead of the word "Clear," signifying to the operator that he could not plunge again until certain conditions had been complied with. To release the plunger, the trip rod must be lifted back to its normal position. This can be effected only by reversing the operator's signal lever and again putting it in the forward or home position. When the signal lever is reversed, the plunger rod is drawn to the bottom of its stroke (see fig. 2). In its downward stroke the pin 36 on plunger rod 33 (figs. 4 and 5) forces aside pawl piece 38, which then snaps back in normal position above pin 36, resting on and supported by it. When the signal lever is returned to its normal or home position, and the plunger rod is forced upward, it lifts with it trip rod 34 and restores it to its normal position; the pressure of pawl piece 38 against sliding block 39 keeps them in the same relative position as when the trip rod was down, and in this way the sliding block 39 is lifted up out of the way and the plunger is ready to be operated again, as is indicated by the word "Clear," which is again displayed. It thus appears that when an operator plunges he is mechanically prevented from plunging a second time until he reverses his lever and again restores it to its normal or home position.

It will now be shown that when an operator plunges and releases the lever of the operator next to the rear, the electrical circuit thus utilized is automatically broken and cannot be made complete again until the train for which the preceding operator desired to give a clear signal has passed over the intervening block. The automatic action of breaking and restoring the lock circuit may be understood by reference to figs. 8 and 9, which indicate the relation, connection and mutual interaction of the Sykes instrument, the interlocking relay and the insulated section of track. Two tracks are shown in the plan, but only such instruments and circuits are shown as are necessary for the control of trains in both directions, between two adjacent block stations 8 and 9. For a continuous system two sets of instruments at each station are required. Two different views of the top of the Sykes instrument are given in each, fig. 8 and fig. 9, so as to better display the contacts and circuits which are broken and established by the up-stroke and the down-stroke of the cross bar 28 which takes its motion from the plunger 27, as has been previously explained. The interlocking relays are shown in their normal condition, the upper magnets dead (owing to the break in the circuit at 31), and their armatures down; the lower magnets charged from the track battery, and their armatures up.

Suppose operator 8 desires to clear his signal to

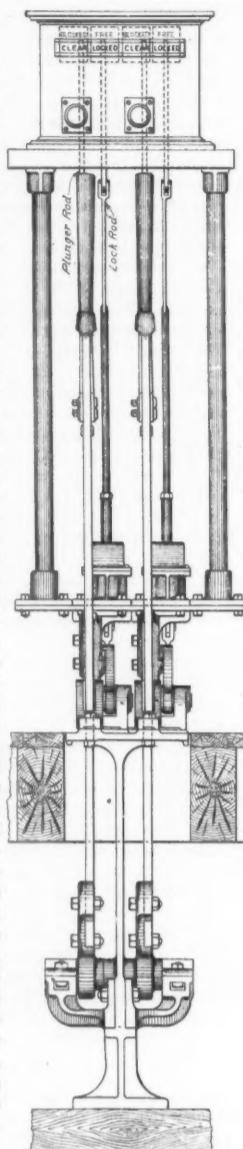
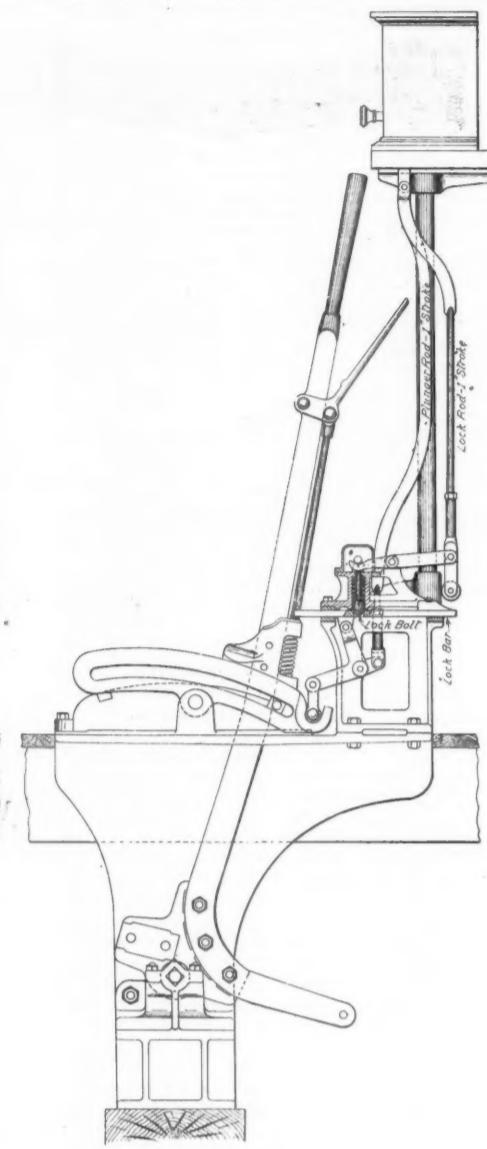
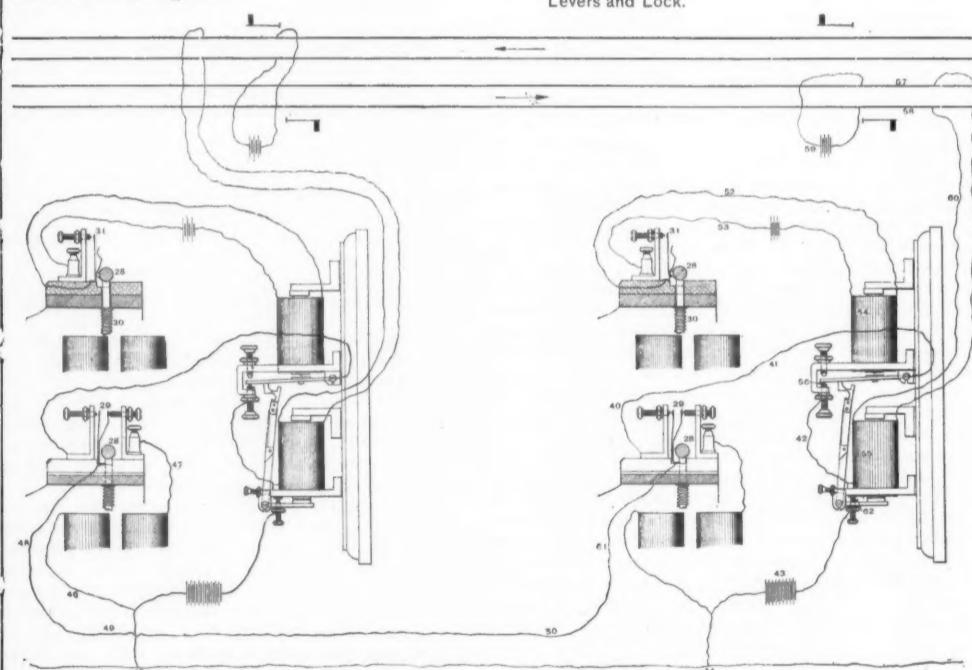
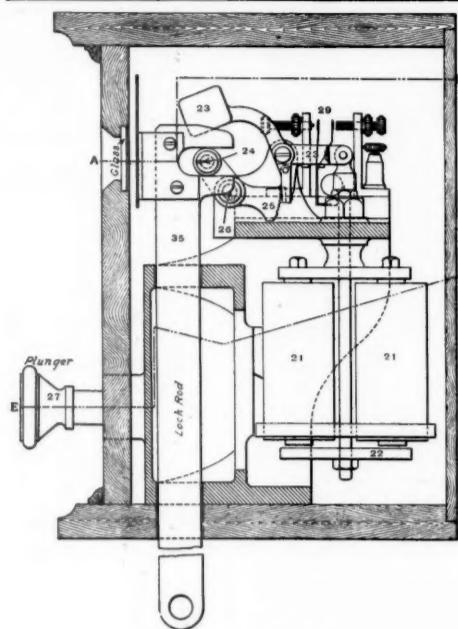


Fig. 1.

Fig. 2.
Levers and Lock.



farm implements, pianos, etc. The cost of transferring decorations in this way as compared with hand work is said to be less than one-half, and in many cases less than one-fifth, or even one-tenth.

Singularly, however, the method has never been applied to the decoration of railroad cars in this country until very recently. It is, however, largely used in Germany for this purpose. There the carriages and locomotives all bear the coat-of-arms of the German Government, which is uniformly put on with transfers. For the freight equipment the coat-of-arms is put on with stencils and yellow paint. Mr. E. B. Wall, Superintendent of Motive Power, Pennsylvania lines west of Pittsburgh, Southwest system, was struck while in Europe by the convenience and economy of this process. On his return he induced the firm of Palm Brothers & Company, of Cincinnati, to make some transfers for use on his rolling stock. This company are the principal dealers in decalcomania in this country, and have a large factory for its manufacture in Nuremberg, Germany. They made for Mr. Wall from the designs of Mr. Billings, Master Painter at the Columbus shops, transfers of letters, numbers and borders, as well as of notices to be placed inside of passenger cars. A number of these have been used at Columbus, with the result of very much reducing the cost as compared with handwork. The use of the process has been begun at Altoona also, and Palm Brothers & Company have made transfer of the Pennsylvania Railroad coat-of-arms to be used on the Hansom cabs at the Broad Street Station, Philadelphia.

The method has other advantages than the reduction of cost, viz., absolute uniformity, accuracy and clearness of outline. It is said that the transfers are also durable. Of course this cannot yet be demonstrated from the experience of the Pennsylvania Company, as the use of transfers is so very recent with them; but from the extensive application of the method of Germany and to various manufactured articles in this country, it is probable that there is no reason to complain of want of durability. Obviously, it is something very well worth trying, for it is quite probable that finer results can be got than with painting, at a considerable saving of cost.

The M. C. B. Coupler on Curves.

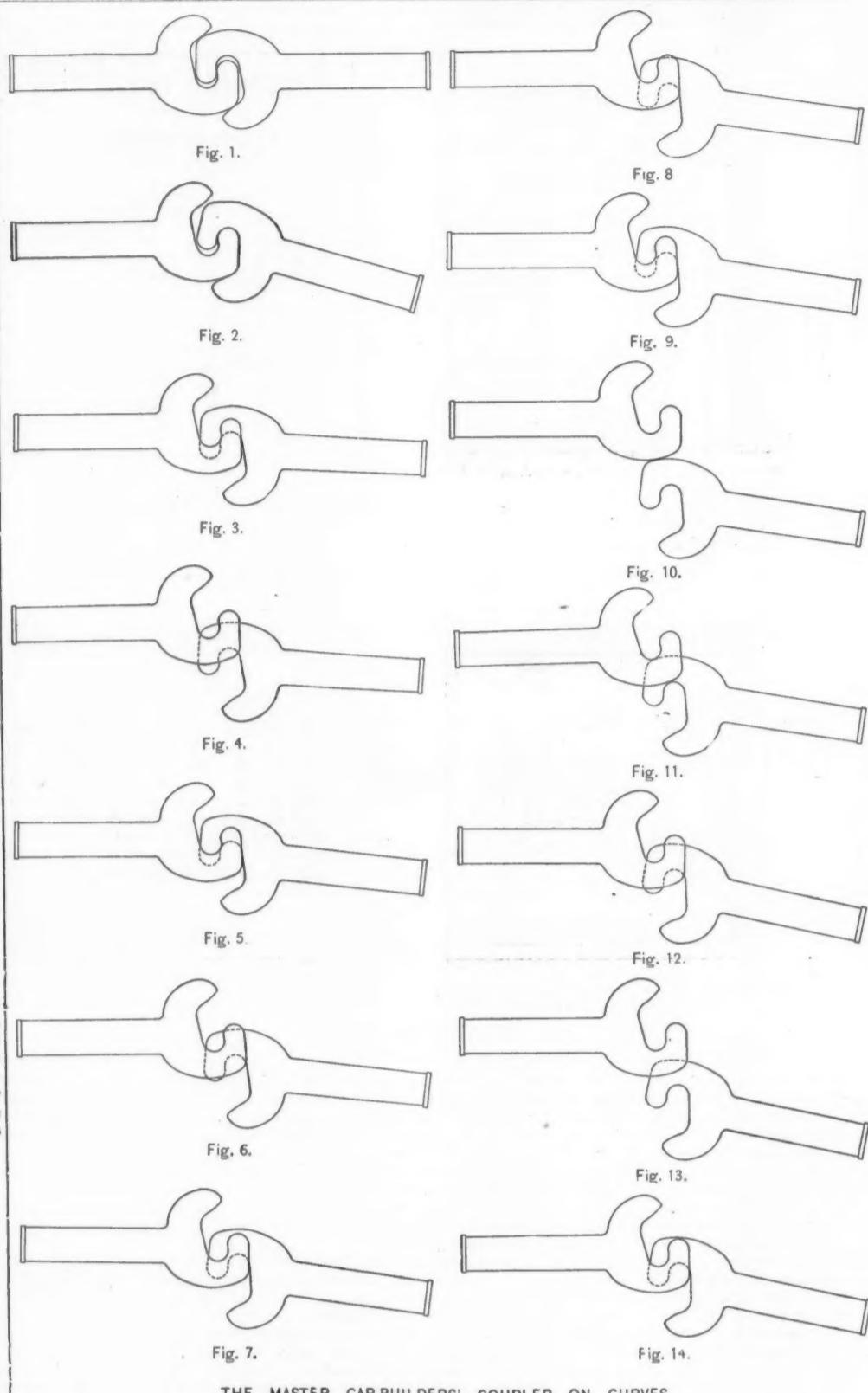
On the editorial page we have discussed somewhat some of the difficulties which arise with the M. C. B. coupler in coupling cars of different length on curves of short radius. The conditions are made apparent in the 14 diagrams which appear herewith, showing the interference of one coupler with another on curves. In each of these diagrams one coupler is shown in full lines. The portion of the other coupler which overlaps this, is shown in the dotted lines. These diagrams will give a very clear idea of the amount by which one coupler will interfere with another under the given conditions. It must be remembered that the relative positions of the couplers, as shown in the diagrams, do not allow for any movement of the cars themselves literally, or of the drawbars in the stirrups. The following list explains what the coupler diagrams represent:

- Fig. 1, couplers in running position on tangent.
- Fig. 2, the same on maximum curve.
- Fig. 3, baggage car and locomotive tender on 10° curve.
- Also furniture car and locomotive tender on 10° curve.
- Also furniture car and hopper gondola on 10° curve.
- Fig. 4, postal car and locomotive tender on 10° curve.
- Fig. 5, 34 ft. box car and locomotive tender on 20° curve.
- Also 34 ft. box car and caboose on 20° curve.
- Fig. 6, 34 ft. box car and coal dump on 20° curve.
- Also 34 ft. box car and baggage car on 10° curve.
- Also baggage car and locomotive tender on 20° curve.
- Also furniture car and locomotive tender on 20° curve.
- Fig. 7, furniture car and hopper gondola on 20° curve.
- Also 34 ft. box car and caboose on 30° curve.
- Also 34 ft. box car and locomotive tender on 30° curve.
- Fig. 8, 34 ft. box car and coal dump on 30° curve.
- Fig. 9, 34 ft. box and furniture car on 20° curve.
- Fig. 10, postal car and locomotive tender on 20° curve.
- Fig. 11, furniture car and locomotive tender on 30° curve.
- Fig. 12, furniture car and hopper gondola on 30° curve.
- Fig. 13, Pullman and baggage car on 20° curve.
- Fig. 14, furniture car and 34 ft. box car on 30° curve.

In the table will be found the offsets and angles of the couplers on curves of 10°, 20° and 30° with cars of various dimensions. In the first two columns are given the distances from centre to centre of trucks and the overhangs—that is, the distances from centre of truck to extreme end of drawbar. The other quantities are explained in the diagram, fig. 15, which shows two cars of different length on a curve. *D* and *E* are the positions of the truck centres on the centre line of the track. The distance from *C*, the end of the coupler, to the truck centre we have called the overhang and indicated by *A*. The angles between the centre lines of the cars and the tangent of the curve, which vary with cars of different length, is shown by *Y*. The length of the wheel base is *B*, and the offset or distance from the end of the coupler to the track centre is *F*.

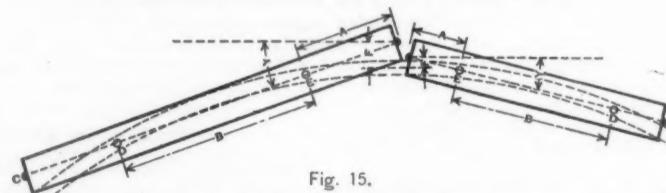
Short Spans with Floors of Old Steel Rails.

Railroad bridges of very short spans are often thought of not sufficient importance to engage much of the time and study of the engineer; however, to each long-span bridge hundreds of short spans can be found, and in the aggregate they are enough to warrant the attention of those interested in the economic management of railroads. The maintenance of traffic over bridges, the maintenance of superstructure, of substructure and of

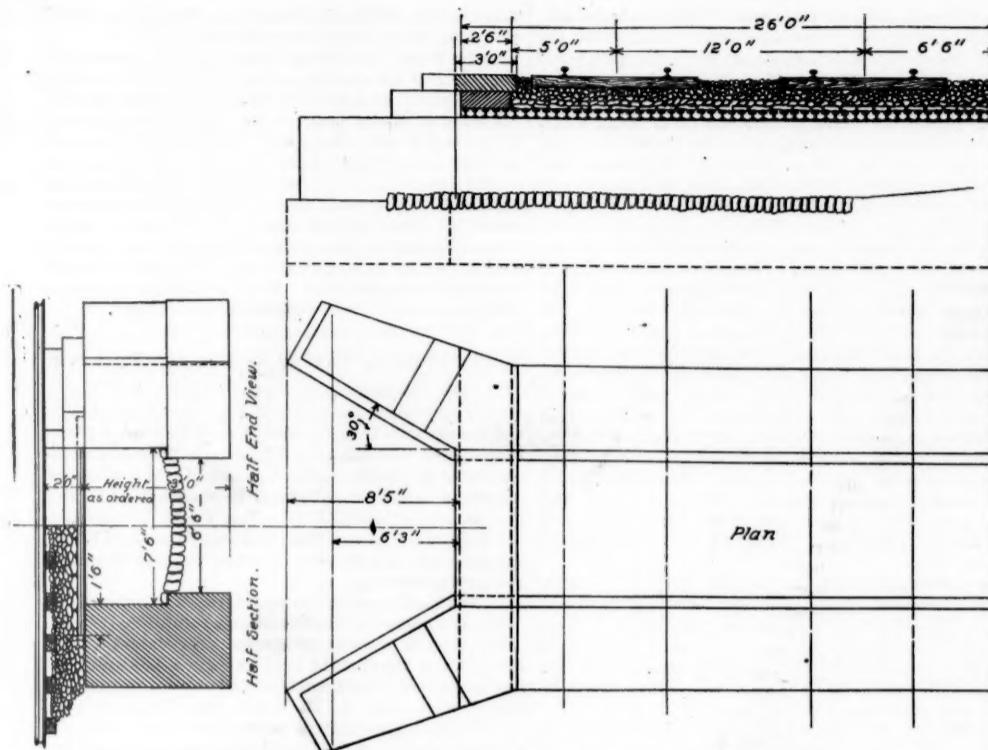


THE MASTER CAR-BUILDERS' COUPLER ON CURVES.

TABLE SHOWING THE OFFSET FROM THE CENTRE OF THE TRACK AND ANGULARITY OF M. C. B. CAR COUPLERS ON CARS OF DIFFERENT LENGTHS AND ON CURVES OF VARYING RADIUS.



| Overhang-distance from centre of truck to end of coupler. | Distance between truck centres. | Angle <i>Y</i> , 10° curve. | Offset <i>F</i> , 10° curve. | Angle <i>Y</i> , 20° curve. | Offset <i>F</i> , 20° curve. | Angle <i>Y</i> , 30° curve. | Offset <i>F</i> , 30° curve. |
|---|---------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|
| <i>A</i> , feet. | <i>B</i> , feet. | <i>Y</i> , 10° | <i>F</i> , inches. | <i>Y</i> , 20° | <i>F</i> , inches. | <i>Y</i> , 30° | <i>F</i> , inches. |
| 5 | 5 | 0° 45' | .48 | 1° 30' | .84 | 2° 13' | 1.56 |
| 5 | 10 | 1° 0' | .72 | 2° 0' | 1.56 | 2° 58' | 2.01 |
| 5 | 14 | 1° 12' | .90 | 2° 24' | 2.04 | 3° 33' | 3.00 |
| 6 | 18 | 1° 30' | 1.44 | 2° 59' | 3.00 | 4° 27' | 4.44 |
| 6 | 22 | 1° 42' | 1.80 | 3° 24' | 3.48 | 5° 2' | 5.28 |
| 6 | 26 | 1° 54' | 2.04 | 3° 47' | 3.96 | 5° 38' | 6.00 |
| 8 | 30 | 2° 18' | 3.12 | 4° 35' | 6.36 | 6° 48' | 9.60 |
| 10 | 34 | 2° 42' | 4.56 | 5° 23' | 9.12 | 7° 58' | 13.56 |
| 10 | 38 | 2° 51' | 5.04 | 5° 46' | 9.96 | 8° 32' | 14.88 |
| 10 | 42 | 2° 58' | 5.40 | 6° 10' | 10.80 | 9° 7' | 16.08 |
| 11 | 46 | 3° 21' | 6.60 | 6° 45' | 13.08 | 9° 59' | 19.68 |
| 12 | 50 | 3° 42' | 7.80 | 7° 21' | 15.48 | 10° 51' | 22.92 |



Plan and Section, one-half of a Four-Track Bridge, 52 ft. wide.

SHORT SPAN BRIDGE, WITH FLOOR OF OLD RAILS.

track, each specialties in railroad work, should all be considered in the design of short span bridges.

While some situations point to the arch, or box culvert, the cast iron pipe, etc., as the best means of passing minor openings, conditions sometimes require open bridges—veritable traps for derailed trains, as many of them are. The abolition of these open, short-span bridges, or culverts, is desirable from a railroad man's point of view, for reasons too numerous to mention.

Economy follows in some cases from the adoption of rail-floor bridges like that shown in the engraving, and an open minor span thereby becomes closed or covered. The avoidance of "man traps" in the track is in itself an economy. The avoidance of the shock experienced on open short-span girder bridges, the step from elastic bank to rigid bridge, and off again, is also an economy. Getting rid of the frequent track surfacing at the approaches of short-span girder bridges is an economy; and where a heavy and severe traffic has pounded out the substructure, the rebuilding and maintenance of which is expensive, economy will in some cases result from the uses of rail-floor bridges, conditions being favorable.

If an I-beam bridge superstructure has, through the heavy tonnage passing over it, broken up the substructure, the abutments must be rebuilt to maintain the I-beams; and a usual cost of two short-span single-track abutments will be, say, \$600. It is cheaper to spend from \$50 to \$100 in repairing the old masonry and floor the bridge with rails, as the old masonry with a ballasted bridge will endure for an indefinite time, and the old steel rails for the bridge (65 lb.), at \$21 per ton, will cost but \$72, to which \$3 should be added for ballast, while the common ties used, with usual spacing, are cheaper than sawed and long bridge ties closely spaced; and on rail-floor bridges the ties cannot bunch, being packed with ballast.

Occasionally a short-span, with scant head room, can conveniently be treated with rail floors, as 16 in. from base of rail to under part of floor is the maximum thickness of bridge required. In many cases new short-span bridges with floors of steel rails, can be constructed cheaper than girder bridges, for common culvert masonry is all that is required, costing about half as much as bridge masonry.

Old rail floor bridges are not necessarily protected from corrosion if under 6 ft. span; over 6 ft. the old rails may be coated with black oil for from 30 cents to 50 cents per track, or with asphalt at a cost of from 60 cents to \$1.25 per track. Absolute and permanent protection can be obtained by the use of asphalt concrete laid between and over the rails, in which case drainage must be provided for. Usually the rails are laid with a spacing of $\frac{1}{4}$ in., which allows engine cinders dropping on the ballast to pass through with the rain.

The construction of these bridges, as very largely used on the New York Central & Hudson River, is shown in the engraving. The details are very simple. It is rare that cut stone is used. The work is done and finished in such a way that the upper appearance is that of an arched bridge. A light stone parapet, such as is usual in arch culverts, is ordinarily laid on the outer rails, as shown. A footing of about 18 in. is allowed at each end of the rails, which are laid as close together as they can be brought. Originally the rails were covered with a

layer of loose, flat stones to hold the ballast, but this has been found to be unnecessary, even where gravel is used, and the ballast is now placed directly on the rails. The track is kept up on the bridge precisely as on the embankment, and the fact that there is a bridge cannot be detected by an experienced track supervisor crossing it on a train, either by feeling or by sound.

In expense the solid rail-floor bridge falls far below any other style. The cost of a four-track bridge is about \$265. In one instance a solid floor bridge was put in for \$500 where bridge builders asked \$1,000 for a girder bridge.

The span is naturally limited, and the maximum is placed at 8 ft. for old 65-lb. rails to carry engines with 10 tons on each driver, and at 9 ft. for engines with 8 tons on each driver with the same class of rails. Longer spans can be constructed where new rails are used, but it is inadvisable to subject old rails to too much deflection. The engraving clearly illustrates the details of one of these bridges, and gives the dimensions that are followed on the New York Central & Hudson River Railroad.

Such bridges might be very economically used on small roads that have old rails for which they have no use in yards and sidings, while the number of these short span structures is far greater than the long span, which calls for more serious engineering work. In brief their advantages are low cost, easy maintenance, smooth riding for cars and engines, and safety.

For the information which we have given above we are indebted to Mr. George H. Thomson, Bridge Engineer New York Central & Hudson River, who is a consistent advocate of solid floors for long as well as short spans.

Buildings and Structures of American Railroads.*

NO. 5.—READING ROOMS AND CLUB HOUSES FOR EMPLOYEES.

BY WALTER G. BERG.

Most of the large railroads of the country at their main termini or junction points have special rooms set apart for the use of employés, who are forced to spend more or less time at such stations. The Union Pacific is the only road which, to the writer's knowledge, has a special standard design for a reading room for use at points along its lines. This design, however, while very tasteful, does not cover all the requirements that can be made of such a building and is, in addition, too elaborate to be recommended as a standard for general adoption. In order to meet with general favor in providing quarters for employés, the principal conditions to be observed consist in removing all unnecessary restrictions and in offering the men a comfortable set of rooms to sleep or lounge about in, with suitable accommodations for writing, reading, smoking, talking or playing games. Any two-story frame dwelling house, such as railroad companies are often compelled to buy in acquiring right of way in the vicinity of stations, can, at a very small expense, be changed into a comfortable home for the men. The ground floor should have a room for preparing reports (if not provided elsewhere), a reading room, a smok-

*Copyright, 1890, by Walter G. Berg and condensed from a forthcoming book on the subject.

ing room and also a sitting room with lounges and comfortable chairs, if the space permit. Upstairs there should be several bedrooms for men obliged to stay at the station over night, whose regular homes are at other places along the line, and a room with a large number



Fig. 1.

of cots on which men can rest for a few hours between runs. The usual toilet and bath room facilities would complete the list. A house of this kind, with a janitor to look after it, would contain all that the employés of a railroad could desire in this line.

The Railroad Branch of the Young Men's Christian Association has done much toward furnishing proper accommodations for railroad men at a number of the principal termini of the country, where railroad man-



Fig. 2.

agements through false economy or a lack of forethought have been careless about securing to trainmen a place for the much needed rest between runs and the proper kind of recreation when off duty.

As mentioned above, any small frame building, or floor in a larger building, can generally, with very little expense and trouble, be fitted up for trainmen's quarters, and it is a very short-sighted management that cannot appreciate the numerous advantages to be derived from furnishing the men with comfortable quarters and suitable accommodations. Below will be found several descriptions of employés' reading or club rooms and sleeping quarters which may prove of additional interest in connection with this subject.

Standard Reading Room, Union Pacific Railway.—The standard reading room of the Union Pacific,

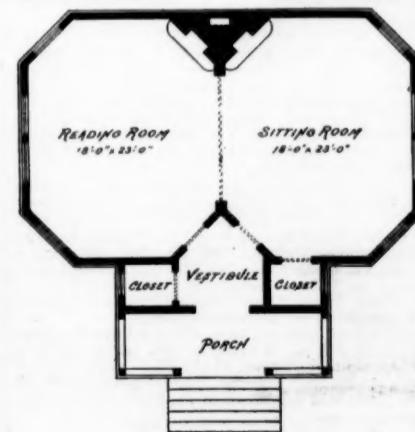


Fig. 3.

shown in figs. 1, 2 and 3, presents a very pretty and original design for the purpose. It is a small, one-story, frame cottage, 24 ft. x 28 ft., with a large front porch 20 ft. wide. The interior is divided into two octagonal rooms, which serve respectively as reading room and sitting room. They are connected by a pair of large doors, which can be thrown open, when desired, to make

one large room of the interior. A vestibule with closets on both sides leads from the porch to the inner rooms. The foundations of the building are shown to be stone. Besides the ordinary furniture each room is provided with large, ornamental book cases.

Railroad Branch Building, Young Men's Christian Association, at East Buffalo, N. Y.—As a well-arranged and interesting design, we present the plans of the Railroad Branch Building, Y. M. C. A., at East Buffalo, N. Y., shown in figs. 4 and 5, as published in the *Railway Review*,



Fig. 4.

Oct. 6, 1888. This building is a substantial structure, three story and high attic, 75 ft. x 36 ft., with stone and brick walls, the interior being appropriately fitted up. The arrangement of the interior is shown on the plans, and the following description of the building is taken from the publication mentioned:

The basement, which is high and light, will contain a dining room, lunch counter, kitchen, pantry, barber shop, shower and sponge baths, and toilet accommodations, as indicated in the plan, fitted up neatly and with all modern improvements. The woodwork will be of hard wood.

The first floor will contain a reading room and library. A room devoted to different games adjoins the main hall, as does the office lobby into which the general secretary's room will open. Across the hall, as shown in the plan, are two light, airy rooms which will be used for a hospital. A third ward and the nurses' room of

The Sioux City Bridge.

The contractors for the substructure of the Pacific Short Line Bridge over the Missouri River at Sioux City, Iowa, have begun work. The first pile in the temporary service track trestle was driven on the 22d of September, and work is now being pushed forward rapidly from the Iowa side.

wagon roads and two sidewalks. It will be low grade, with two pivot spans, one close to the Iowa shore, the other close to the Nebraska shore, where the main channel is at present. The total length of the bridge will be about 2,137 ft., divided as follows: Starting from either shore—one 90-ft. plate girder; one pivot span, 470 ft. between end pins; two fixed spans, 500 ft. between end pins; one pivot span, 470 ft. between end pins, and one 90-ft. plate girder. The arrangement of spans is perfectly symmetrical.

Very deep foundations will be required, as the borings show the rock underlying the river bed to be from 75 ft. to 105 ft. below low water. Of the five principal piers the two deepest will be sunk by dredging, the others by the usual pneumatic method. The shell and cribs for the two piers to be sunk by dredging will be of iron. One for the pivot pier on the Nebraska side will be cylindrical in plan, with four cylindrical dredging shafts terminating in bell mouths flaring out to cutting edges. Besides the outer cutting edge there will be two cross cutting edges, so that the lower part of the pier will be divided into four excavating chambers. The other dredging pier will be rectangular, with semi-circular ends, in plan, and will have five dredging pockets. The cutting edges will be so arranged as to divide the lower part into five chambers. Both will be built without batter.

The caissons and cribs for the three piers to be sunk by the pneumatic method will be of timber, of the usual design. The small piers will be composed of two plate iron cylinders braced together. They are to be sunk as far as practicable; piles are then to be driven from the inside of the cylinders, and finally the cylinders will be filled with concrete.

All the piers are to be concrete up to a foot below low water mark. Above this level the shafts will be carried up with a shell of limestone, with concrete backing, to the coping, which will be only 6 ft. above high water mark.

The accompanying table gives the principal dimensions of the five larger piers:

been tried on the Long Island and other roads, and is said to have been found very efficient.

In fig. 2 we have the spur lock used with woodwork. The action of the spurs engaging in the wood is obvious. This is largely used by car builders and bridge builders.

A letter from the Superintendent of the Morden Frog & Crossing Works states that this nut lock has been adopted for all frogs and crossings made by him, and that it is the best device that he has ever seen for holding a nut in position. The Jones Safety Nut Lock Co. shows numerous testimonials from different railroads expressing entire satisfaction with the device. It is said to be in use on over 200 railroads, and large orders are constantly being received. Within a few days an order has been received for 3,500,000 of these nut locks.

The International Meeting of Iron and Steel Men.

The international meeting of the American Institute of Mining Engineers, the Iron and Steel Institute (British) and the German Iron Workers (Verein Deutscher Eisenhüttenleute) will begin in Pittsburgh Thursday morning, Oct. 9. Monday and Tuesday of this week the American Institute of Mining Engineers held its 57th meeting at Chickering Hall in New York. The meeting of the British Iron and Steel Institute began on Wednesday morning, and sessions were to be held Thursday and Friday mornings.

AMERICAN INSTITUTE OF MINING ENGINEERS.

The first session of the 57th meeting of this body began at 2 o'clock on Monday afternoon. Sir James Kitson, President of the British Iron and Steel Institute; Sir Lowthian Bell, Past President, and other distinguished guests were present. The President of the Institute, Mr. Abram S. Hewitt, was in the chair. Mr. James F. Lewis, Chairman of the Local Committee, welcomed the Institute to the city and announced the programme of entertainment. Mr. Hewitt made a brief opening address, preserving his stated address for the first session of the Iron and Steel Institute.

Various routine business was transacted, and then

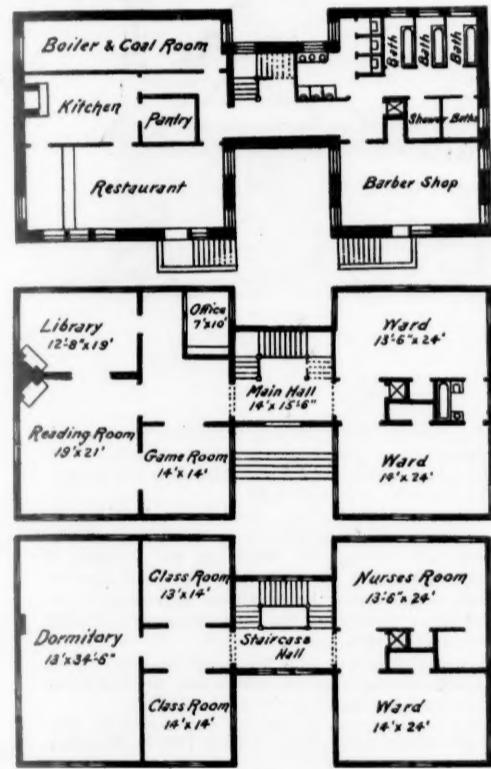


Fig. 5.

the hospital are on the second floor, as are the dormitory, two class rooms, which can be easily turned into one large parlor, and necessary store rooms.

The second floor will be fitted up for the use of the janitor and with additional sleeping rooms. A wing, not shown in the illustration, will be devoted to a gymnasium, that much appreciated portion of every well-planned association building.

Employés Club House, Chicago, Burlington & Northern Railroad.—The employés club house of the Chicago, Burlington & Northern is a handsome brick building with hardwood finish, fitted up and supplied with all modern and essential appointments. On the first floor are a reading room, smoking room, billiard room and toilet. On the second are 12 large bedrooms, 2 bathrooms and a large toilet room. Every room is heated by steam, lighted by gas and ventilated in the best manner.

Several other buildings of this class might be mentioned, but these will serve as examples. Especial mention should be made, however, of the New York Central building erected by Mr. Cornelius Vanderbilt and opened Oct. 3, 1887. This was described in the *Railroad Gazette* Oct. 7, 1887.

The Sioux City Bridge.

The contractors for the substructure of the Pacific Short Line Bridge over the Missouri River at Sioux City, Iowa, have begun work. The first pile in the temporary service track trestle was driven on the 22d of September, and work is now being pushed forward rapidly from the Iowa side.

| DESCRIPTION OF PIERS. | PIERS OF THE SIOUX CITY BRIDGE. | | | | Iron shells to be sunk by the dredging method. |
|-----------------------------------|------------------------------------|---|---------------|---------------|--|
| | Cylindrical pivot pier. | Timber Caissons to be sunk by the Pneumatic Method. | | | |
| Number from Iowa side. | 3. | 4. | 5. | 6. | 7. |
| Masonry shaft, size under coping. | 33.5' diam. | 10' x 35' | 12' x 38' | 10' x 35' | 33.5' diam. |
| Size at footing. | 33.5' " | 12' x 37' | 14' x 40' | 12' x 37' | 33.5' " |
| Footing course, upper. | 35" " | 13.5' x 38.5' | 15.5' x 41.5' | 13.5' x 38.5' | 35" " |
| " lower. | | 15' x 40' | 17' x 43' | 15' x 40' | |
| Height of masonry. | 27.5' | 32.5' | 32.5' | 32.5' | 27.5' |
| Batter of shaft. | 0 | 3/8" to 1" | 3/8" to 1" | 3/8" to 1" | 0 |
| Crib, top. | { Octagonal. 38' 6" short diam. | 19' x 44' | 20' x 46' | 19' x 44' | Cylindrical. 38.5' diam. |
| Cutting edge. | 38' 5" " | 24' x 44' | 25' x 46' | 24' x 44' | 38.5' " |
| Probable depth below low water. | 87.5' | 78.0' | 88.0' | 102.0' | 103.5' |

The contractors for the whole structure are the Phoenix Bridge Co. Sooysmith & Co. have the sub-contract for the foundations.

The Jones Safety Nut Lock.

The nut lock shown here is a very simple, positive lock which is being used very largely and with good results. It is made of tempered steel, of the various forms shown in the cuts. It is a washer as well as a nut lock, and is adapted to any kind of a bolt or nut.

In fig. 1 is shown the nut lock for track joints. A and

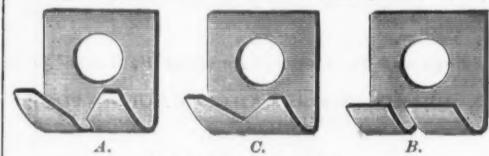


Fig. 1—For Track Joints.

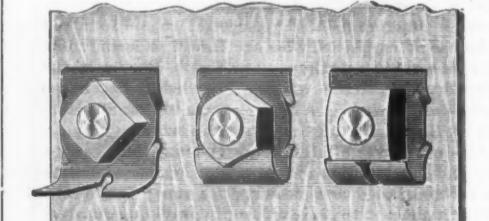


Fig. 2—For Wood.

The Jones Safety Nut Lock.

B are for square nuts and C is for a hexagon nut. When applied to the track joint the lock is put on with the notched end downward, but bent as shown. It fits into the angle of the angle splice, which prevents the lock turning. When the nut is screwed home the notched end is bent up enough to engage the nut. Lock A is designed to engage a square nut by the corner; lock B by one of the sides, and lock C applies to one angle of a hexagon nut.

A safety switch lock nut on the same principle has

Mr. J. C. Bayles read a paper on Explosions from Unknown Causes. He related three instances which had come under his own observation. One was the bursting of a 16-in. pipe carrying air under pressure of about one pound. The pipe was of light galvanized iron with soldered seams. There appeared to be no possible connection of this pipe with the gas conduits. On a warm June afternoon this pipe exploded with great violence. Every window in the mill was blown out and considerable other damage done. The disk closing the end of the pipe was projected against a brick wall with such violence that it remained fastened in the wall, and is there yet, a mural tablet commemorating the event. Owing to the manner of making the connections for taking off the air from the main about 80 ft. of one end of the pipe was a dead end. It is supposed that gas accumulated in this part of the pipe until an explosive mixture was formed, but Mr. Bayles can find no other explanation of the presence of gas or vapor than that it was formed by the volatilization of the oil lubricating the trunnions of the blower. In fact, the accident taught nothing whatever, but the air pipe has been replaced by a 16-in. steel tube, the end of which has a small opening.

The second explosion was that of a No. 6 Sturtevant blower. The blower was inside the mill and used to furnish blast for the gas generators. This was its first day of service in this position and Mr. Bayles was watching it. Suddenly it disappeared. Fragments weighing 20 to 50 lbs. were distributed in all directions. The explosion was accompanied by a violent report and succeeded by a dense cloud of yellow-brown, offensive smelling smoke. This explosion was thoroughly investigated. It was not a centrifugal rupture. It was conjectured that during the stoppage of the engine gas from the producer worked up and into the blower, which had been stopped and started a very short time before the explosion. This explanation has never appeared satisfactory to Mr. Bayles, as the explosion was entirely local, not a joint being started in the pipe which led to the blower. Moreover, it had been running at least four minutes immediately before the explosion; therefore no gas could have remained in it. So this explanation taught nothing.

The third was an explosion of gas in the purifier house of a gas works; but there is no clue to the method in

which the explosive mixture was ignited. In summing up Mr. Bayles said that if he had investigated these accidents less closely he might have reached satisfactory conclusions.

The other papers read at this session were of special interest to mining engineers. One of them was on ore dressing by electricity at the Tilly Foster Mine. The electro-magnetic separator of G. Conkling, described at the meeting of the Institute Feb. 18, 1889, has been in successful operation at the mine for a considerable period. There had been great and peculiar difficulties in operating the system, and while the results may be considered in the main very favorable, they are not sufficient to thoroughly establish its value.

At the evening session papers were presented by Mr. W. B. Potter, of St. Louis, on the Iron Mountain Mines, and Mr. W. F. Durfee, of Birdsborough, Pa., on the Use of the Diamond Drill. Both of these were illustrated by stereopticon slides.

The morning session of Wednesday was presided over by Mr. Eckley B. Coxe, Vice-President. The first paper read was by Mr. H. C. Spaulding, of Boston, on Electric Power Transmission in Mining Operations. Mr. Spaulding's paper is one of considerable interest, as he briefly describes, and shows by illustrations, applications of electric power to drills, coal cutters, hoists, mining locomotives and pumps. The paper is descriptive, with no discussion of the economies from the use of electric power in mines. Mr. H. H. Campbell, of Steelton, Pa., sent a paper on Chemical and Physical Formulae in Steel Working, which, in the author's absence, was not read. Mr. J. P. Carson, of New York, had a paper on the Excavation of the New Croton Aqueduct. This is a monograph of permanent value.

At the afternoon session a paper was presented by Mr. R. M. Daelen, of Dusseldorf, Germany, on Recent Improvements in German Steel Works and Rolling Mills. Mr. S. P. Welman, of Thurlow, Pa., read a paper on Charging and Heating Melting Furnaces. The next paper was A Suspended Feed Table for Rolling Mills, by James Morgan, of Pittsburgh. That was followed by a paper on Pneumatic Hoisting, by H. A. Wheeler, of St. Louis. Other papers of considerable interest were read at this session. In the evening Mr. Fteley gave a description of the Aqueduct work, with lantern slides, and Mr. James Douglass, of New York, also read a paper, illustrated in the same way, on Copper Resources of the United States. Other papers of much interest and value are in type, particularly a long one by Mr. Eckley B. Coxe, on the Iron Coal Breaker at Drifton, Pa., with a description of the machinery used for handling and preparing coal. In future issues we shall give abstracts from some of these papers which are of special interest to our readers. This session closed the meeting of the American Institute.

BRITISH IRON AND STEEL INSTITUTE.

The meeting of this body began Wednesday morning at 9:30 at Chickering Hall, New York. Sir James Kitson, the President, was in the chair. Mr. Andrew Carnegie, Chairman of the General Committee, made a short speech of welcome. This was replied to by Sir James Kitson, who then read his annual address. This was a paper admirable in form and substance. It was largely historical, dealing with the past of the Institute and with its influences upon the iron industries of Great Britain and of the world. He then spoke generally of the growth of the iron and steel industries, presenting some striking figures. Among other things it was said that the consumption of pig iron in the United States in 1889 was 310 lbs. per head of population. In the United Kingdom it was 300 lbs., but the consumption in the United States was nearly all confined to articles used in the country, while a great deal of the pig iron consumed in the United Kingdom was exported again in the form of machinery and other products. The consumption for the whole world was estimated at 14½ lbs. per head. If the whole world consumed pig iron at the rate of the United States the annual demand would be 270 million tons. Sir James spoke briefly of the policy of the two governments toward the iron and steel industries, and said, in substance, that the two great countries would be able to supply all possible demand for years to come, the United States finding its market within its own borders and Great Britain supplying the rest of the world. The bearing of this delicate allusion to the tariff policy of the United States was not lost upon the audience.

At the conclusion of Sir James Kitson's address Mr. Lewis, Chairman of the Local Committee, said a few words of welcome, and briefly outlined the programme of entertainments. While he was speaking General Sherman came in, and was received, of course, with enthusiastic applause.

Mr. William P. Shinn, President of the American Society of Civil Engineers, as Chairman of the Transportation Committee, made a very clear statement of the arrangements made by that committee for the transportation of the guests and of their baggage. He said that transportation would be provided for about 600. They will be carried in three trains, each train having two dining cars. These trains will be run on special schedules. Every care will be taken by the committee to secure the systematic and prompt handling of the baggage of the guests which will be taken from their rooms at their hotels and delivered again in their rooms at their places of destination.

Mr. Abram S. Hewitt was to have made an address at this session, which was to have been the special feature of the morning. The Bessemer gold medal of the Iron and Steel Institute was to have been presented to him on the occasion. Unfortunately, Mr. Hewitt was too ill to be present. Sir Lowthian Bell, who is Mr. Hewitt's guest, explained that it would have been dangerous for him to venture out, and briefly gave such a description of the very elaborate paper that Mr. Hewitt had prepared as to make his hearers realize how much they had missed by his illness.

Mr. James Gayley, of Bessemer, Pa., read a paper on "The Development of American Blast Furnaces with Special Reference to Large Yields." After a historical sketch of the increase in output and decrease in fuel per ton of iron produced he described a furnace of remarkable and unprecedented performance.

This furnace was built in 1885-3. The total height is 80 ft.; the diameter of hearth, 11 ft.; the diameter of bosh, 23 ft. The bell is 12 ft. in diameter, and the stack 16 ft. The cubical capacity is 19,800 ft. There are seven tuyeres, each six inches in diameter.

The furnace was started in October, 1886. The record for the next three months is as follows: November, 6,735 tons of iron, with a consumption of 2,128 lbs. of coke per ton of iron; December, 7,494 tons of iron, with 2,105 lbs. of coke; January, 8,338 tons, with 1,935 lbs. of coke per ton of product. From January to May inclusive, the average monthly output was 8,150 tons, on a coke consumption of 1,980 lbs. The volume of air blown was 27,000 cu. ft. per minute, which was heated to an average temperature of 1,200 degrees.

The furnace was in blast—exclusive of the two stoppages I have mentioned—two years, seven months and ten days, and made in that time 224,785 tons of iron, on an average coke consumption of 2,317 lbs. The output for the first twelve full months was 88,940 tons, on 2,150 lbs. of coke. The best output for any one week is 2,462 tons. The temperature of blast averages 1,100 degrees, and the pressure 91.2 lbs. The temperature of the escaping gases is 340 degrees. Counting the time the furnace was running in the first blast, and up to the end of May, 1890, in the second blast, including also the time spent in relining, the period covered is three years and five months, and in that time this furnace has made an output of 301,205 tons, a record which is unparalleled. In the month of May this, together with a companion furnace of precisely the same dimensions, made an output of 20,192 tons, on an average coke consumption of 1,882 lbs. per ton of iron. The ores used are from the Lake Superior region, and yield through the furnace 62 per cent. of iron. The proportion of limestone carried is 28 per cent. of the ore burden, and about 1,200 lbs. of cinder are made per ton of iron. The average analysis of the cinder is as follows: Silica, 33.00 per cent.; alumina, 13.00 per cent.

I shall not undertake to say what these furnaces will accomplish on an uninterrupted blast, but I believe the day is not far distant when we shall be able to show a record of 300,000 tons from a furnace in three years, and on a single lining.

In the period covered by the last decade there are three steps in the development of American blast-furnace practice that might be mentioned—first, in 1880, the introduction of rapid driving, with its large outputs and high fuel consumption; second, in 1885, the production of an equally large amount of iron with a low fuel consumption, by slow driving; and, third, in 1890, the production of nearly double that quantity of iron, on a low fuel consumption, through rapid driving.

The discussion was opened by Sir Lowthian Bell, who said that the problem was to account for the production by the American furnace of about five times as much iron as has been hitherto made from the furnaces using poor ore in the North of England, and about twice as much as those in England of like dimension using hematite ore—all this being accomplished in the particular case under consideration by the expenditure of 16.8 hundredweights of coke per ton of iron. He showed that the coke used in the furnace was inferior to the English fuel, and in other points the conditions would seem to be in favor of the English furnace. An important source of lost heat, however, might be found in the escaping gases, and the lessening of this has a bearing on the large make of the furnace described by Mr. Gayley. He did not think that the saving was due to the facility with which the Lake Superior ore of this country was reduced.

Mr. E. S. Cook, of Pottstown, Pa., followed Sir Lowthian Bell, but was interrupted by the adjournment for the day.

In the afternoon a large party of visiting iron masters and American guests made an excursion up the Hudson River by steamboat. The programme of Thursday and Friday included sessions in the morning and excursions to various points of interest. Thursday evening the Iron and Steel Institute held its annual banquet at Delmonico's, and the Verein Deutscher Eisenhüttenleute attended a reception given to them by the Liederkranz Society. Drives were arranged for the ladies on the several days. Saturday morning the party leaves New York for Philadelphia, and the international session will begin in Pittsburgh, Thursday, Oct. 9.

Rodger Ballast Car.

On Wednesday of last week a party of railroad superintendents and chief engineers of roads centering in Chicago was taken to Corwith station, six miles from the city, on the line of the Santa Fe road, to see an exhibition of the practical operation of the Rodger Ballast Car, which has been described in the *Railroad Gazette*.

A train of twenty ballast cars and one plow was used, loaded with Joliet gravel. The men in charge were allowed to proceed with the ballasting without any specific order as to speed, etc., thus enabling the spectators to form a fair opinion of the every-day service of the ballast train.

The material was deposited in the centre of the track,

the car next to the engine being dumped first. Five cars were thus dumped consecutively, the plow following at the end of the train, spreading the ballast evenly and cleaning the rail. This was done with the train running about five miles an hour.

The train was then backed up and a second coat added to the first layer, when the track was ready to be surfaced. The practicability and economy of the car were well shown, and those in the party who are familiar with track work were very much pleased with the demonstration.

Superintendent Wheeler said that he was so well pleased that he had just placed his second order for these cars, his road having upwards of 100. He believed they would pay for themselves in six months' service. The Illinois Central has also purchased a large road, and several other large roads have ordered trial lots.

This exhibition is the third of its kind with these cars at Chicago; the first was made with broken stone, the second with rolling-mill slag, and the last, as above described, with gravel. These tests show that the economy in the use of the cars is not altered by the character of the material. One car load will ballast about 40 ft. of ordinary track and an entire train of 20 cars can be unloaded in less than 10 minutes and speed need not be reduced below eight miles an hour.

Train Accidents in August.

COLLISIONS.

REAR.

2d. on Philadelphia & Reading, near Tuckerton, Pa., a freight train ran into the rear of another freight, wrecking engine and 14 cars. Brakeman injured.

2d. on Alabama Great Southern, near York, Ala., a freight train ran into the rear of a preceding freight, damaging engine, caboose and 3 cars.

4th, on Delaware & Hudson Canal Co.'s road, near Port Kent, N. Y., a freight train broke in two on a curve, and the rear portion was run into by a closely-following freight, wrecking engine and 7 cars. Two trainmen injured.

4th, on Atlanta & Florida, at Zebulon, Ga., a freight train standing at the station was run into by a following construction train, doing considerable damage.

5th, on New York, New Haven & Hartford, near Milford, Conn., a freight train broke in two and the detached portions collided, wrecking 4 cars.

7th, on Atchison, Topeka & Santa Fe, near Conway, Kan., a passenger train, the conductor of which disregarded orders, ran into a construction train, doing considerable damage. Three trainmen injured.

7th, on Cincinnati, Hamilton & Dayton, near Leipsic Junction, O., a passenger train collided with some box cars which had been switched upon the main track, and 5 of them, together with the engine, were wrecked. Engineer badly hurt.

9th, on Louisville & Nashville, near Belmar Switch, Ala., a standing freight was run into in the rear by another freight, wrecking engine, caboose and 4 cars. An employee riding in the caboose was killed.

11th, on Rome, Watertown & Ogdensburg, at Adams Centre, N. Y., a passenger train running at speed struck a misplaced switch and collided with some freight cars standing on a siding, wrecking a number of them, together with the engine, baggage car and a coach. Fireman injured. It is thought that the switch had been maliciously misplaced.

11th, on West Shore, near Clark's Mills, N. Y., a freight train ran into the rear of a preceding freight, and several cars were wrecked and burned up.

12th, on East Tennessee, Virginia & Georgia, at Howell's, Ga., a freight train ran into the rear of a freight standing on the main track instead of on a siding, badly wrecking engine, caboose, and several freight cars. The fireman was severely injured by jumping, but the engineer, who stayed in the cab, escaped with slight scratches.

15th, on Union Pacific, near Portland, Ore., a special passenger train ran into the rear of a freight, wrecking engine, the forward end of one coach, caboose, and several empty box cars.

16th, on Pittsburgh, Cincinnati & St. Louis, near Mansfield, Pa., a freight train ran into the rear of a preceding freight, throwing 8 cars loaded with cattle over an embankment. Engineer, fireman, and several drovers injured.

17th, on Pittsburgh, Cincinnati & St. Louis, at Midway, Pa., a freight train ran into the rear of another freight, wrecking engine and 8 cars. Three trainmen injured.

17th, on East Tennessee, Virginia & Georgia, near Braswell, Ga., a freight train ascending a grade broke in two and the rear portion ran back into another freight, doing considerable damage. One trainman injured.

18th, on Wisconsin Central, at Glidden, Wis., a freight train ran into a box car which had been blown out of a siding so as to obstruct the main track, wrecking engine and 8 cars. Brakeman killed, engineer and fireman injured.

19th, on Union Pacific, at Bonner Springs, Kan., a Chicago, Rock Island & Pacific freight ran into the rear of a Union Pacific freight, wrecking the locomotive of the former and half a dozen cars in each train.

19th, 4:30 p. m., on Northern Pacific, at Garrison, Mont., a freight train descending a grade was not controlled and ran into a locomotive standing on the main track, forcing it into the rear of a passenger train standing at the station, badly wrecking the rear sleeper and the next coach, together with both engines and a number of freight cars. One passenger was killed and 8 injured.

20th, on Kansas City, Fort Scott & Memphis, near Pauli, Kan., a freight train ran into the rear of a Missouri, Kansas & Texas passenger train, wrecking one of the cars of the passenger train and pushing the whole train forward into a disabled freight train further ahead, which had been the occasion of the passenger train's stopping. Sleeping car conductor killed.

20th, on Union Pacific, near Pueblo, Col., a disabled

freight train was run into by a closely following freight, wrecking engine and 10 cars. Brakeman slightly injured.

20th, on Atchison, Topeka & Santa Fe, at Wynnwood, I. T., a passenger train ran over a misplaced switch and into the rear of a freight standing on a side track, wrecking the caboose and injuring 2 trainmen.

21st, at East Buffalo, N. Y., a West Shore freight train was run into at the rear by a New York Central & Hudson River empty engine, damaging 3 cars.

21st, on Illinois Central, at Cobden, Ill., a passenger train which had been brought to a stop on a descending grade by a disabled freight ahead was run into at the rear by a fast fruit train, doing some damage. Brake man killed, several passengers injured.

22d, on Chicago, Santa Fe & California, at Niota, Ill., a freight train ran over a misplaced switch and into some box cars standing on a siding, wrecking engines and several freight cars, and injuring 3 trainmen. The switch had been misplaced by a section hand, who thought it was in the wrong position.

23d, on Burlington & Missouri River, at Muilen, Neb., a freight train standing on a siding was run into at the rear by another freight because a brakeman was unable to turn a defective switch. Engine, caboose and several cars wrecked. A passenger, an employé and a tramp were killed and 6 trainmen injured.

23d, on Central New England & Western, at North Bloomfield, Conn., a passenger train was run into at the rear by a freight train, badly damaging the rear (empty) car.

24th, on New York Central & Hudson River, near Fairport, N. Y., an eastbound freight train broke into three parts, which afterwards collided, wrecking a number of cars and obstructing the opposite track. A freight train moving in the opposite direction ran into the obstruction, wrecking engine and 10 cars. Engine and fireman injured.

24th, on Pennsylvania, at Mountsville, Pa., a fast freight train ran into the rear of a construction train, wrecking engine and several cars, injuring the engineer.

27th, on New York Central & Hudson River, at Buffalo, N. Y., a freight train broke in two and the rear portion ran back down grade and into the head of a switching freight, damaging engine and 8 cars.

27th, on Pittsburgh, Fort Wayne & Chicago, at Newport, Pa., a passenger train ran into the rear of another passenger train, damaging engine and 3 coaches. Two trainmen injured.

28th, on New York & New England, near Andover, Conn., an accommodation train ran into the rear of a freight train which was on the main track, apparently without having a flag out, doing slight damage.

29th, on Housatonic road, near Bethel, Conn., a freight train broke in two and the detached portions collided, wrecking 8 cars. Brakeman injured.

30th, on Illinois Central, at Baskidell, Ill., a freight train ran into another freight, wrecking several cars.

BUTTING.

1st, on New York, Lake Erie & Western, near Batavia, N. Y., butting collision between passenger train and an empty engine, disabling both locomotives and damaging a baggage car.

1st, on Illinois Central, at Makanda, Ill., a freight train ran over a misplaced switch and into the head of another freight, damaging both engines.

1st, on Chesapeake & Ohio, at Obion, Tenn., a passenger train running about 15 miles an hour was turned on to a siding by a misplaced switch, and collided with an construction train, wrecking both engines and damaging platforms and draw-gear of the passenger cars. Three trainmen and 2 passengers injured.

2d, on Louisville, New Albany & Chicago, at Green castle, Ind., 3 cars loaded with lumber ran down grade out of a siding and on the main track 2 miles, colliding with a freight train on a bridge. Considerable damage was done to both cars and bridge.

3d, on Louisville, New Albany & Chicago, near Guthrie, Ind., butting collision between two passenger trains, by reason of the engineer of one of them failing asleep and running three miles past a meeting point. Engines and forward cars in each train badly wrecked. Three trainmen and one passenger killed, 4 trainmen and 4 passengers injured.

4th, on Delaware River road, at Gibbsboro, N. J., butting collision between a freight train and an empty engine, killing the master mechanic of the road, who was in charge of the latter. Both engines and a number of cars wrecked.

7th, on Chicago & Northwestern, near Chicago, Ill., a suburban passenger train struck a misplaced switch and ran into an engine standing on a siding, wrecking both locomotives. Mr. George W. Tilton, Superintendent of Motive Power and Machinery of the road, who was riding in the baggage car, was thrown violently forward and struck his head against a trunk, receiving injuries from which he died 10 days later.

8th, on Houston & Texas Central, near Howe, Tex., butting collision between a passenger train and a construction train, due to the engineer of the latter attempting to go to the next station on the other train's time. Both engines and forward cars in each train were badly wrecked. Two trainmen killed, conductor and several passengers injured.

10th, on Louisville & Nashville, near Sparta, Ky., a passenger train ran into a freight backing into a siding, disabling both engines. Two trainmen and a tramp injured.

11th, on Delaware & Hudson Canal Co.'s road, at Cobleskill, N. Y., butting collision between a regular passenger train and an excursion train, disabling both engines.

11th, on New York Central & Hudson River, near Fisher's, N. Y., butting collision between two freights, due to a dispatcher's mistake, badly wrecking both engines and 15 cars and killing 3 trainmen.

12th, on New York Central & Hudson River, near Schenectady, N. Y., collision between an engine hauling a car containing detectives and a helper engine returning to this station, both locomotives moving tender first. The latter broke away from its derailed tender, and, having been abandoned with reversed lever, ran uncontrollably to Karners, about 9 miles, and collided with some freight cars. One occupant of the coach injured.

13th, on Illinois Central, near Centralia, Ill., butting collision between two freights, wrecking both engines and the forward cars in each train.

13th, on Louisville & Nashville, near Ducker's, Ky., butting collision between a passenger train and a pay train, owing to the latter attempting to go to the next station on the other train's time. Both engines, baggage car and several coaches wrecked. Engineer killed and the paymaster, 5 trainmen and a passenger badly injured.

11th, on Cincinnati Southern, at Danville, Ky., one of freight trains as one of them was entering a

side track, wrecking engine and 5 cars. Engineer badly hurt and a tramp stealing a ride killed.

14th, on Burlington & Missouri River, near New Castle, Wyo., a coal train descending a steep grade became uncontrollable and collided with a construction train, wrecking engine and 8 cars. One employé killed and 4 injured.

14th, on Baltimore & Ohio, in Philadelphia, an engine was turned on to a siding and collided with another engine owing to a stone having lodged between the rails at the switch. The damage was slight.

15th, on New York, New Haven & Hartford, at East Haven, Conn., an eastbound express train approached the station at too high speed and ran into a westbound accommodation train which was about to take the side track to meet the former, badly damaging both engines. The engineer of the westbound train saw that the other was coming too fast and moved his train backward sufficiently to considerably mitigate the severity of the collision. The newspaper report that there was a defect in the air brakes was unfounded.

15th, on St. Louis, Alton & Springfield, near Alton, Ill., butting collision between a passenger train and a construction train on a curve, wrecking both engines, a mail car and one car in the construction train, killing 3 laborers and injuring 8 laborers, an officer of the road and 5 trainmen.

19th, night, on Richmond & Danville, near Atlanta, Ga., a string of 20 freight cars which had been left on a siding insecurely braked ran down grade and on the main track several miles and collided with a freight train while moving at high speed, making a very bad wreck.

20th, on Denver & Rio Grande, near Palmer, Col., butting collision between two locomotives moving at high speed, wrecking both. An engineer was killed and a fireman badly injured.

21th, on Chicago & Atlantic, near Disko, Ind., butting collision between 2 freight trains, wrecking the forward part of both. It is stated that one of the trains ran past an appointed meeting point.

25th, on Southern Pacific, near Pantano, Ariz., collision between a passenger train and a construction train, injuring 2 trainmen and 5 laborers.

26th, on Mobile & Ohio, near Waterloo, Ill., the engine of a freight train was struck by some box cars which had escaped control on a grade ahead of it and ran down the hill. Three men injured.

26th, on East Tennessee, Virginia & Georgia, in Macon, Ga., butting collision between a freight train and a switching freight, wrecking both engines and 2 cars and derailing a number of others.

26th, on Pittsburgh & Western, near Butler, Pa., butting collision between two locomotives, wrecking both. Two trainmen injured.

27th, on Bellaire, Zanesville & Cincinnati, at Tunnel Hill, O., butting collision between a passenger train and a freight train, disabling both locomotives and derailing a coach.

29th, on Lake Erie & Western, at Bloomington, Ill., collision between freight train and yard engine, wrecking both locomotives and killing an engineer.

29th, on Wabash, at St. Louis, Mo., butting collision between two engines, due to a misplaced switch.

30th, 10 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, at Addyston, O., the engineer of a pay-car train, in starting suddenly from the station to escape some robbers who had attacked the paymaster while he was outside of the car, ran violently into some freight cars, badly damaging them and the locomotive.

31st, on Missouri Pacific, in Kansas City, Mo., butting collision between Kansas City, St. Joseph & Council Bluffs passenger train and a switching engine, damaging both locomotives. Engineer hurt.

CROSSING AND MISCELLANEOUS.

1st, on Michigan Central, in Detroit, Mich., collision between a passenger train and a yard engine hauling a carload of hogs, doing slight damage. The yard engine, which had been abandoned with reversed lever, started back and collided with some empty passenger cars, doing some damage and killing a number of hogs.

2d, at the crossing in Crestline, O., a Cleveland, Cincinnati, Chicago & St. Louis freight ran into the side of a Pittsburgh, Fort Wayne & Chicago freight, damaging engine and several cars.

2d, on St. Louis & Hannibal, at Hannibal, Mo., collision between a passenger train and a switching engine, wrecking baggage car and one coach. Three passengers killed and brakeman and 3 passengers injured.

3d, on Union Pacific, near Reverse, Idaho, the caboose of a freight train ascending a steep grade was set afire by a smouldering cigarette which had been thrown upon the floor where a considerable quantity of kerosene oil had leaked out of a can. The flames made such headway that, after the car was uncoupled, the brakes could not be operated, and it ran back down grade some distance, colliding with and damaging an engine standing at a water tank. The car was totally consumed.

4th, on Columbus Hocking Valley & Toledo, at Prospect, O., a passenger train ran into a freight train backing into a siding, damaging both locomotives.

4th, on Milwaukee, Lake Shore & Western, at Saluit, Wis., a freight train ran into a work train entering a siding, disabling the engines.

14th, on Virginia Midland, at Lynchburg, Va., a freight train collided with some box cars projecting over the main track at a siding, doing considerable damage.

15th, in Chicago, a Chicago, Santa Fe & California freight train was run into at the rear by a Chicago, Rock Island & Pacific freight, doing slight damage.

15th, about 5 p. m., on Michigan Central, at Augusta, Mich., an eastbound express train ran over a misplaced switch while running about 50 miles an hour and crashed into the middle of a freight train standing on a siding. The engine, which was overturned, exploded its boiler; a baggage car, 2 sleeping cars and 6 box cars were wrecked, the latter knocking down portion of the station building. Engineer and fireman killed and 6 passengers injured. A boy playing near the track was struck by a piece of flying debris and badly hurt.

15th, on Pittsburgh, Cincinnati & St. Louis, at Pittsburgh, Pa., several cars on a siding escaped control and ran down grade and into a switching freight which was passing on the main track, damaging a few cars.

16th, on New York Central & Hudson River, at Melrose, N. Y., a light engine ran into the side of a locomotive of a switching freight going through a crossover, tearing it loose from the cars and overturning it, injuring 3 trainmen. The other engine, which was not derailed, having been abandoned before the collision, ran five miles to the Grand Central Station at New York City, where it stopped for lack of steam.

16th, on Atlantic City, N. J., the two rear cars of a West Jersey passenger train were turned upon an adjoining track by the premature throwing of a switch,

broke loose from the train as the tracks diverged, and collided with a Camden & Atlantic passenger train, damaging several coaches and the locomotive. Several passengers injured by flying glass.

24th, at Virginia Point Crossing, Tex., a Gulf, Colorado & Santa Fe passenger train ran into and wrecked the last two cars of an International & Great Northern freight, disabling the engine.

25th, on Boston & Albany, at Hinsdale, Mass., a freight engine in backing on to a train was allowed to run too fast and a slight collision ensued, derailing one car. The engineer reversed the locomotive and jumped off before the collision, and before he could regain his place in the cab the engine started off unattended and ran 15 miles down an 80-ft. grade to Chester, where in response to a telegram it was side tracked. The engine, which weighed 60 tons, was run upon high coal trestle and fell off the end into a coal heap; the coal being soft, the damage to the engine was not very great.

28th, on Boston & Maine, at Dover, N. H., collision between passenger train and switching engine, derailing 2 coaches.

30th, on Evansville & Terre Haute, at Evansville, Ind., a locomotive bound for the roundhouse ran over a misplaced switch and into the side of some freight cars, throwing a number of them against an adjacent building and killing a pedestrian.

DERAILMENTS.

DEFECTS OF ROAD.

1st, on Chicago & Atlantic, at Espyville, Ind., all the cars of a passenger train running about 30 miles an hour were derailed at defective or unfastened switch, the baggage car being overturned and damaged.

4th, on Great Northern, near Ripon, N. D., passenger train derailed and ditched by the spreading of the rails. Three trainmen and 2 passengers injured.

4th, night, on Atlantic & Pacific, near Yucca, Ariz., a freight train fell into a stream, the bridge over which had been washed away in a cloudburst, killing fireman and badly injuring engineer and brakeman.

7th, on Louisville & Nashville, at Birmingham, Ala., the two rear cars of a passenger train were derailed by the breaking of a switch-bolt.

7th, on Kansas City, Memphis & Birmingham, near Amory, Miss., the caboose and 3 cars of a freight train were derailed and wrecked at a point where the roadbed had been impaired by heavy rains.

9th, on Union Pacific, near Unity, Or., a freight train was thrown from the track by the spreading of the rails. Brakeman killed, conductor injured.

19th, on Denver, Texas & Fort Worth, near Trinchera, Col., a construction train broke through a bridge which had been impaired by a freshet, and 4 cars went down into the arroyo and were wrecked. One employé was killed and 18 injured.

26th, on Illinois & St. Louis, at Lenz, Ill., engine and 10 cars of a freight train were thrown from the track by the spreading of the rails.

31st, on East Tennessee, Virginia & Georgia, near Atlanta, Ga., 3 cars of a passenger train were derailed by a defective switch and overturned.

31st, on Pittsburgh, Fort Wayne & Chicago, near Chicago, Ill., passenger train derailed by a defective switch, the engine being overturned and damaged.

DEFECTS OF EQUIPMENT.

6th, on Philadelphia & Reading, near Lebanon, Pa., a car of a freight train broke down and a number of cars were derailed and damaged, injuring a tramp.

10th, on Louisville & Nashville, near Henry Ellen, Ala., a coal car in a freight train broke down, wrecking 4 other cars.

14th, on Victoria & Western, near Rockbridge, Va., engine and one car of passenger train derailed by the dropping of the tender brake beam, injuring engineer and fireman.

14th, on Pennsylvania, near Bristol, Pa., 4 cars of a freight train were derailed and wrecked by the breaking of an axle, blocking all the main tracks.

17th, on Chesapeake & Ohio, near Buchanan, Va., a wheel under a car in a freight train broke and a number of cars were derailed and wrecked. Brakeman injured.

22d, on Alabama Great Southern, at Olmstead, Ala., a car of a freight train was derailed and wrecked by a broken wheel.

24th, on Baltimore & Ohio, at McGowan's Siding, Md., several cars of a freight were derailed and wrecked by the breaking of a journal, injuring 2 trainmen.

25th, on Seaboard & Roanoke, near Weldon, N. C., several freight cars were derailed and wrecked by the breaking of an axle.

26th, on Union Pacific, near Salt Creek, Kan., passenger train derailed, the engine, baggage car and one coach being overturned and wrecked. Conductor and 4 passengers injured. The accident is supposed to have been caused by a broken truck under the baggage car.

27th, on Pittsburgh, Fort Wayne & Chicago, near Rock Point, Pa., 11 cars of a freight train were derailed and wrecked by the breaking of an axle.

28th, on Pennsylvania, at Adara, Pa., 14 cars of a freight train were derailed and wrecked by a broken wheel. An overhead bridge was knocked down and added to the wreck.

30th, on Pennsylvania road, at South Elizabeth, N. J., a car of a construction train was derailed by a broken truck and dragged some distance, tearing up the roadbed and demolishing a station platform. After setting out the disabled car and running a short distance, 8 cars were derailed at a switch and wrecked, obstructing traffic five hours.

30th, on Union Pacific, near Montpelier, Or., passenger train derailed by a broken journal under the tender, 2 chair cars and a dining car being overturned in the ditch, injuring a passenger.

NEGIGENCE IN OPERATING.

12th, on Erie & Wyoming Valley, near Dunmore, Pa., a locomotive standing on a heavy grade started off while the fireman was turning a switch and the engineer was on the ground, ran some distance at high speed, and was derailed at a safety switch.

13th, on New York Central & Hudson River, in New York City, 7 freight cars were run into a hay shed at too great speed, demolishing a scale house and doing other damage.

13th, on New York Central & Hudson River, in New York City, yard engine derailed by a misplaced switch.

18th, on Bennington & Rutland, at North Bennington, Vt., a special passenger train consisting of engine and one car derailed at a misplaced switch.

19th, at 1 p. m., on Old Colony road, in Quincy, Mass., a northbound express train running about 30 miles an hour was derailed on a curve by a track jack which the sectionmen neglected to remove in season. The engine swerved to one side sufficiently to let the next three cars run by it, but the fourth car, containing about 70

passengers, followed and lodged upon the locomotive in such a way that escaping steam from the blow-off cock at the bottom of the fire-box scalded the passengers, 19 of whom, together with the fireman, were killed, and 30 or more and the engineer were injured.

21st, on Illinois Central, near Cobden, Ill., collision between a freight train and a switching freight, doing considerable damage. Conductor killed.

22d, on Central Pacific, the rear portion of a freight train which had stopped to do some switching at Summit, Cal., ran back down grade to Cascade and collided with the rear portion of a freight entering a siding, wrecking 2 cabooses and 18 cars, doing considerable damage to snow sheds, and throwing a station building and many cars down the mountainside. The conductor and 3 other trainmen were killed. The cars had been left standing on a grade without the hand-brakes being set.

22d, forenoon, on Mount Penn Railroad (a line near Reading, Pa., operated by pushing cars up to the summit of the mountain and allowing them to run down the other side without a locomotive), two cars loaded with passengers became uncontrollable in descending the mountain, and ran at terrific speed to the foot of the grade, where they were derailed, overturned and wrecked, killing 4 and injuring 14 persons. The cars were fitted with the Eames brake, but it seems that it was not in use.

22d, on Burlington & Missouri River, near Lyons, Col., a construction train descending a steep grade became uncontrollable, and was derailed while running at high speed at the foot of the grade, making a very bad wreck. Engineer and 2 employees killed; conductor and 2 employees injured.

22d, on New York Central & Hudson River, near Ludlow, N. Y., owing to a misplaced switch a construction train ran into the side of a freight train moving in the opposite direction on an adjoining track, derailing 8 cars and blocking traffic for some hours.

26th, on Baltimore & Ohio, near Point of Rocks, Md., a passenger train ran over a misplaced switch, derailing and wrecking engine and postal car. Engineer killed, fireman hurt.

UNFORESEEN OBSTRUCTIONS.

1st, on Covington & Macon, near Athens, Ga., an empty passenger train, the engine of which was moving tender first, ran over a cow and was derailed, one car going over an embankment. Two trainmen injured.

3d, on Cincinnati, New Orleans & Texas Pacific, near Oakdale, Tenn., engine and some of the cars of a passenger train wrecked by running into a boulder which had rolled down upon the track. Engineer and fireman killed.

5th, on International & Great Northern, near Oakwoods, Tex., a freight train ran over a calf and the engine and 4 cars were derailed and wrecked. Engineer and fireman injured.

7th, on Louisville, New Orleans & Texas, near Clarksville, Miss., a train consisting of engine, caboose and one car, with the engine in the centre, ran over a cow and was derailed and wrecked, killing the conductor, and seriously injuring the brakeman.

10th, on Memphis & Charleston, at White Station, Tenn., forward end of passenger train derailed at a purposefully misplaced switch. Fireman injured by jumping.

10th, on Baltimore & Ohio Southwestern, at State Cut, O., a passenger train ran into a landslide, ditching the engine. Several trainmen injured.

12th, on Chicago, St. Louis & Pittsburgh, near Knightstown, Ind., a work train ran over a cow, derailing tender and 1 car. Six laborers injured.

14th, about 10 p. m., on Baltimore & Ohio, near Osceola, Pa., a passenger train ran into some cross ties which had been maliciously placed between and on the rails, derailing engine, baggage and 4 sleeping cars, the former being overturned and badly wrecked. The engineer, a man riding on the locomotive and a tramp stealing a ride on the front end of the baggage car were killed.

14th, on Northern Pacific, at Spokane Falls, Wash., engine and 5 cars of a freight train derailed and wrecked by a rock which had been thrown upon the track at a point where blasting was in progress.

18th, on Queen & Crescent, near Faulkner's, Ky., a freight train was derailed and thrown over an embankment at a point where spikes had been maliciously withdrawn from the rails.

20th, midnight, on Southern Pacific, near Pantano, Ariz., engine and 4 cars of a freight train were derailed and overturned at a washout, just beyond a bridge, the cars being piled upon the locomotive and falling 30 ft. The engineer was killed. He had stopped and carefully examined the bridge before crossing it, but apparently examined only the main structure, not looking for trouble at the approaches.

21st, on Allegheny Valley road, in Pittsburgh, Pa., as a freight train was backing into a siding a switch was maliciously turned, derailing a portion of the train, 5 cars being wrecked. Engineer injured by jumping.

22d, on Union Pacific, near Chapman, Neb., several cars of a freight train were derailed and wrecked at a point where a rail had been maliciously removed.

22d, on Louisville, New Orleans & Texas, near Harrison, Miss., engine and 8 cars of a freight were derailed at a point where a considerable quantity of earth had been washed upon the track in a freshet. Engineer killed, fireman, conductor and a tramp injured.

23d, on Pittsburgh, Cincinnati & St. Louis, near Butler, Pa., freight train was derailed and several cars wrecked at a point where spikes had been maliciously withdrawn from a rail.

23d, on Texas & Pacific, near Fort Worth, Tex., a freight train was derailed by running over a cow, killing a brakeman and injuring engineer and fireman.

24th, evening, on Norfolk & Western, near Radford, Va., a freight train was derailed by running over a cow. The locomotive and 8 cars went over a high embankment, killing the engineer. One of the cars in its descent struck and demolished a laborer's shanty, killing 2 of its occupants, injuring another seriously and 2 others slightly.

25th, on Savannah, Florida & Western, near Albany, Ga., 3 cars of a construction train were derailed by a piece of wood falling off the tender upon the track, injuring 3 laborers.

25th, on Delaware & Hudson Canal Co.'s road, near Crown Point, N. Y., the track gave way under a freight train; 5 cars were buried in the mud. The track gave way under the train and for a distance of over 200 ft. settled to a depth of about 30 ft. The roadbed at this point is close to Lake Champlain and lies against a high ledge of rocks on one side. It was formed of rock and earth, and was evidently constructed over a vein of quicksand, which has been gradually undermining it. The mass of the earth and rocks thus sinking suddenly under the train was so great that a new bank or shore of Lake Champlain was formed 150 ft. farther into the lake.

29th, on New York Central & Hudson River, at East Albany, N. Y., freight train derailed at a switch which had been maliciously obstructed by a coupling pin.

UNEXPLAINED.

1st, on Puget Sound Shore road, near Kent, Wash., passenger train derailed.

3d, on East Tennessee, Virginia & Georgia, near Fluvilla, Ga., several cars of a freight train derailed.

3d, on Baltimore & Ohio, at Grafton, W. Va., a car in a freight train was derailed on or near the bridge over Tygart Valley River, knocking down a number of vertical braces and causing one span of the structure, together with 7 cars, to fall into the stream. A portion of the wreck was burnt up, oil in a tank car igniting the debris. A trackman riding on the cars was injured.

4th, on Southern Pacific, near The Needles, Cal., 2 cars of a passenger train were derailed, one of them being thrown over on its side, injuring a passenger.

5th, on Missouri Pacific, near Hall's, Mo., a freight train was derailed and overturned down an embankment at a point where track repairs were in progress. A brakeman and a passenger riding in the caboose were injured.

6th, on Louisville, New Albany & Chicago, at New Albany, Ind., the engine of a passenger train was derailed and overturned, slightly injuring the fireman.

6th, on Central of New Jersey, at Newark, N. J., a car of a switching freight was pushed off the end of the track and knocked down one of the supports of the trainsheds, causing a portion of it to fall upon a passenger train. Brakeman killed.

7th, on Boston & Maine, near Kennebunk, Me., freight train derailed, wrecking 4 cars and damaging a number of others.

7th, on Philadelphia, Wilmington & Baltimore, near Elwyn, Md., construction train derailed, seriously injuring 2 laborers.

8th, on Long Island road, near Sag Harbor, N. Y., passenger train derailed and engine and several cars badly damaged.

10th, on Pittsburgh & Western, at Allegheny, Pa., freight train derailed and 3 cars damaged.

11th, on Georgia Pacific, at Tommolan, Miss., 5 cars of a freight train were derailed in backing on to a side track.

12th, on Denver & Rio Grande, in a snow shed near Marshall Pass, Col., a passenger car filled with laborers at the rear end of a freight train was derailed, injuring conductor and brakeman.

15th, on Norfolk & Western, near Suffolk, Va., freight train derailed.

15th, on Central of Georgia, near Upton, Ga., 10 cars of a freight train were derailed and wrecked.

15th, on Seattle & Northern, near Avon, Wash., locomotive derailed.

16th, on Charleston, Cincinnati & Chicago, near Lancaster, S. C., engine and 4 cars of freight derailed and damaged. Two trainmen seriously and 2 others slightly injured.

17th, on Norfolk & Western, near Forest, Va., freight train derailed, damaging a number of cars.

17th, on Norfolk & Western, near Christiansburg, Va., several cars of freight train were derailed and wrecked.

18th, on Union Pacific, near Barela, Col., construction train derailed and wrecked, killing 7 and injuring 14 employees.

19th, on Northern Pacific, at Gallatin, Mont., engine and 14 cars of a freight were derailed and thrown over an embankment.

19th, on Delaware & Hudson Canal Co.'s road, near Port Henry, N. Y., engine and 8 cars of a freight train were derailed and went over an embankment, making a bad wreck. Two trainmen killed and another badly hurt.

20th, on Louisville & Nashville, in Birmingham, Ala., a car of switching freight was derailed and thrown against some cars standing on an adjoining track, doing some damage. Of four trainmen standing on top of the car one was instantly killed and the others were badly injured.

21st, night, on Denver & Rio Grande, near Marshall Pass, Col., 5 cars of a stock train were derailed and thrown over an embankment. A brakeman was killed and another seriously injured.

22d, on Terre Haute & Peoria, near Atlanta, Ill., a freight train was derailed on a bridge, and 5 cars and the caboose were tipped off into the creek below. Two trainmen injured.

24th, on International & Great Northern, near San Antonio, Tex., a freight train was derailed at the crossing of the West Side Rapid Transit road.

24th, on New York Central & Hudson River, at Black Rock, N. Y., 7 cars of a freight train were derailed, and 5 of them wrecked.

26th, on Houston & Texas Central, at Houston, Tex., engine and several cars of switching freight derailed.

27th, on Wisconsin Central, at Ashland, Wis., a locomotive was derailed on a dock and plunged into 16 ft. of water.

29th, on Baltimore & Ohio, near Oakland, Md., engine and 17 cars of a freight train derailed, killing many head of cattle. Fireman killed.

30th, on Columbus, Shawnee & Hocking, near Shawnee, O., the locomotive of a construction train was derailed and overturned, killing engineer and fireman and injuring a brakeman.

OTHER ACCIDENTS.

7th, on Georgia Pacific, at Birmingham, Ala., a yard engine blew out her crown sheet, the engineer and firemen being thrown out of the cab and badly injured.

10th, on Great Northern, at Ada, Minn., a colonist sleeping car in a westbound passenger train caught fire and was burned up. The conductor was badly burned in uncoupling the car.

12th, on International & Great Northern, near Highland, Tex., engine and passenger train broke a parallel rod, damaging the boiler and slightly injuring the engineer.

16th, on Boston & Maine, at the junction of the main line of the Eastern Division with the Saugus Branch, near Boston, Mass., the engine of a passenger train struck a cart which was crossing the track and threw it against a switch lever in such a way as to turn the switch and throw 3 of the cars of the train through a crossover track upon the opposite main track. The engineer had, however, applied the air brake and the cars were stopped in about 150 ft., without derailment.

18th, on New York Central & Hudson River, near Oriskany, N. Y., a passenger train struck a truck which had been thrown over from a freight wreck on an adjoining track, damaging the locomotive and tearing off all the steps on one side of the cars.

22d, on Grand Rapids & Indiana, near Shelbyville, Ind., the draw-rigging and entire platform of a passenger car in a circus train was torn off in ascending a grade, killing a circus man and injuring two others.

25th, on St. Louis, Bridge & Tunnel road, in St. Louis, Mo., engine of passenger train blew out a cylinder head, injuring the fireman. A passenger riding on the platform of one of the cars, frightened by the bursting of the cylinder head, jumped from the train, and was probably fatally injured.

25th, on Union Pacific, at Boulder Springs, Col., engine of passenger train blew out a cylinder head.

27th, on New York, Pennsylvania & Ohio, near Mansfield, O., boiler of engine of freight train exploded, killing the engineer and fireman. Several tank cars containing oil took fire and 15 cars were burned up.

28th, on Alabama Great Southern, near Attalla, Ga., front truck of engine of freight train broke down.

30th, on New York Central & Hudson River, at East Albany, N. Y., a freight train broke in two. Brakeman killed.

A summary will be found in another column.

A Birmingham Ship Canal.

The demand of the traders of Birmingham and the midlands for better and cheaper communication with the sea has lately shown signs of revival, according to the London Times, in consequence of "the measure of revision which the Board of Trade offer in their newly published report on railway rates falling so far short of the requirements of midland traders that they begin to despair of relief through legislation, and they are, therefore, turning once again to the consideration of the obvious alternative, namely, improved water communication." After some consideration of rival routes, the one toward Liverpool has been adopted, passing through the heart of the Black Country to Wolverhampton, and thence, in a line nearly due north, through the potteries to Stoke-on-Trent. From this latter town it passes in a northwesterly direction through Kidsgrove and Wheelock to Winsford, where it joins the Weaver. Between Birmingham and this point of junction the distance is 61 miles, and the Weaver navigation extends for another 20 miles to the Mersey, which it strikes at Weston Point, 15 miles from Liverpool. The canal is to be 72 ft. in minimum width, and capable of accommodating sea-going vessels of 300 tons, or barges of 400 tons.

As the scheme is in the hands of a strong provisional committee of well-known local men, and is favored not only by the commercial classes of Birmingham and its vicinity, but by the land owners along the proposed route, by the Manchester Ship Canal Co. and by the Mersey Docks Board, it seems likely to be carried out. On the other hand, of course, it must reckon on the determined opposition of the railroad companies, whose interests it so seriously threatens, and the costs of promotion, therefore, are likely to be heavy.

The estimated cost, including promotion, is not expected to exceed £3,000,000, and the promoters calculate that a charge of four shillings per ton on the carriage of 2,000,000 tons of merchandise yearly would earn 10 per cent on the capital. The traffic over a single canal connected with Birmingham amounted during 1885 to 7,327,269 tons, including merchandise, 972,749; pig iron, 586,434; coal, 3,333,865; iron-stone, 495,912; sand, 115,791; lime and limestone, 140,828; road materials and manure, 525,249; bricks, 460,359, and in the same year 1,499,795 tons of goods were carried into Birmingham by rail and 263,660 tons were taken out. Therefore the amount of traffic does not seem excessive, and as the freight charge on scrap iron from Birmingham to Liverpool, apart from terminal charges, is 10 shillings per ton, the charge of four shillings for carriage seems reasonable.

The carriage of the above estimated merchandise is to be done by the company, which proposes purchasing a fleet of 30 steam barges, each carrying 250 tons, and 30 other barges, carrying 300 tons, to be towed, and a speed of eight or nine miles is expected, so that it will be possible to traverse the distance from Liverpool to Birmingham in 24 hours. It is estimated that each pair of barges will make about 70 trips per annum, giving a gross carrying power of 1,155,000 tons, in addition to which will be the traffic carried in private boats.

The level of the canal, commencing at Birmingham at an elevation of 453 ft. above the sea, fall to tide water at the emptying of the Weaver into the Mersey. This fall will be overcome by the balanced caissons or hydraulic lifts designed by Mr. Clark, and in such successful use on several European canals. The first lift at Wolverhampton will overcome a difference of level of 60 ft., with one or two heavy cuttings between that place and Birmingham. At Trentham there will be a tunnel 900 to 1,200 ft. long through a ridge. From this the new canal will run parallel to the Trent & Mersey Canal, which, in a distance of seven miles, has 25 locks, the passage of which occupies the best part of a working day. In the new canal this fall will be overcome by four lifts. At the junction with the Weaver River navigation, at Winsford, the descent will be made in two stages, as it will be necessary to go under the London & North-Western Railway and the Middlewich branch of the Shropshire Union Canal. The Weaver River navigation is a trust, with which an arrangement has been made for passage at the rate of eight pence per ton, or eight mills per ton mile, said to be favorable terms. The locks on the Weaver are 220 ft. long, 42 ft. wide, with 15 ft. of water on the sills. It is stated that the sides and bottom of the new canal are to be lined with 90 ft. of concrete, to withstand the wash of the passing boats, and that the width of 72 ft. was adopted instead of 60 also on account of the waves generated by the passing tugs.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Our readers will remember that in the articles on American Practice in Block Signaling, published in the *Railroad Gazette* May 2, 9 and 16, and June 6, of this year, reference was made to various illustrated descriptions of the different kinds of apparatus used in connection with the block signaling. Two of the best known of these devices, the Sykes locks and the Hall automatic instruments, had not at that time, however, been fully described in the *Railroad Gazette*. Since then the Hall instruments have been described (in the issues of June 13 and September 12), and we present on another page of this issue a carefully prepared description of the Sykes locking apparatus. This completes the list of the principal devices referred to in the series of articles above mentioned, and for convenience we append references to all of them. A star indicates illustrated articles:

Sykes locks, May 9 and October 3, 1890.
Automatic clock-work track circuit system, June 24, 1887, and May 16, 1890.
Electro-pneumatic track circuit system, June 15th and December 21, 1888, August 23rd and September 26, 1889; June 6, 1890.
Hall automatic wire circuit signal, June 6 and 13, 1890.
Black's mechanical block signal, January 24th and June 6, 1890.

The agreement of the new Southwestern Railway & Steamship Association is spoken of as one of the strongest contracts of the kind ever made, but so far as its details are made public the principal new feature is that confining authority to the higher officers. The strength of this Association depends chiefly on the fact that competition is not so fierce and the results of wars not so disastrous as in territory where railroads are more numerous. In the latitude of Chicago the same lack would be found in this as in other agreements, to wit, the absence of any provision for settling disputes. To assume that everything will go through unanimously is presuming too much on the angelic nature of traffic men.

The M. C. B. Coupler on Curves and Mixed Trains.

A number of breakages of vertical plane couplers have recently occurred, the cause or causes of which have been difficult to determine. For instance, in backing in or pulling out of a siding a coupler has been broken off where the shank joins the head. Many such breakages may be directly attributed to the conditions which obtain when long and short cars are

coupled in one train and which will be briefly discussed in what follows. There would have been more failures of this class but for the fact that most of the cars thus far equipped are nearly of the same length, and there are few instances where short and long cars are coupled together and hauled around sharp curves. In the future, when the standard coupler is more generally used, trainmen will have to be careful when entering sharp curves with mixed trains. Between locomotive tenders and baggage cars, as well as between some short and long coaches, it has already been found necessary to use a link or a connecting bar when passing sharp curves, while entering yards, or passing through cities. This may not be a matter requiring immediate investigation, yet it is well that it be borne in mind, as it may explain some of the difficulties which have already been experienced when short ore and coal cars are coupled indiscriminately in trains of longer cars. A 20° curve is not an unusual one in freight yards, and yet it is seen from the diagrams shown on another page that a dump car coupled to a 40-ft. box car could not pass such a curvature without a lateral displacement of 5 in. In many cases, of course, these cars have swing trucks which assist materially in allowing the necessary displacement.

To facilitate investigation of this matter we have prepared the diagrams and table on page 678 which show the offset and angularity of M. C. B. couplers when cars of several different lengths are coupled on curves. On 10° curves, with train of average freight cars, the angularity and offset are very small, and hardly worth consideration; while, on the contrary, on a 30° curve the angularity and offset between passenger cars and freight cars are greater than is indicated on any of the diagrams shown. If such cars are to be run in the same trains, the effect of the curvature in producing different offsets of the couplers from the centre of the track must be carefully considered. The table will be found useful in such considerations. For instance, if a car with an 18-ft. wheel base and a 6-ft. overhang from the centre of the truck to the end of the coupler is to be coupled to another car with a 38-ft. wheel base and a 10-ft. overhang, the offsets on a 20° curve will be found to be 3 in. and 9.96 in. respectively, or a difference of 6.96 in. in the offset, which will require that much displacement in the car bodies at the extremities before the cars can pass the curves safely. Of course the lateral freedom of the trucks and coupler assist in this displacement. This appears from the offsets given in the column of offsets for a 20° curve opposite the wheel bases and overhangs assumed and found in the columns A and B. For intermediate wheel bases and overhangs a correction may be made to the offsets given by making additions or subtractions, as the case may require, from the figures given. The dimensions calculated in the table are sufficient to cover nearly all existing designs with reasonable approximation. In the case just assumed, the angularity of the couplers may be found by adding the angles given in the column Y for 20° curves, the sum in this case being 8° 45'.

Every train conductor should be provided with some rule governing this point, and he should know what cars coupled together would pass the curves on his road without making trouble. Already it has happened that locomotive tenders have been lifted bodily to one side of the track in passing curves when coupled to Pullman cars. In such cases the difficulty has been overcome by placing a connecting bar between the couplers.

There is, of course, no complete remedy for this state of affairs which would be acceptable, and it is doubtful if any remedy is necessary provided reasonable care is exercised by trainmen and conductors when taking sidings and sharp curves, and also provided that couplers when mounted upon very short cars have considerable lateral motion. The standard movement of the drawbar in the stirrup— $\frac{1}{2}$ of an inch—is not sufficient for locomotive tenders or for short cars, and should be materially increased, even at the risk of making it necessary to move the coupler to a central position before coupling.

The necessity for mixed trains of passenger and freight cars was referred to at the last recent meeting of the Western Railway Club. This was offered as an argument for the use of the vertical plane coupler in both passenger and freight service. We have shown here that on a 10° curve a 34-ft. box car and a Pullman would project beyond the centre of the track in such different amounts as to displace the couplers laterally about 6 in.; and if the trucks under the box car were rigid centre, the result would be a lateral pressure, which would decidedly endanger derailment. In such cases as this an increased clearance in the stirrup would materially assist in allowing cars to pass curves safely; but there is a limit to the amount of increased clear-

ance that can be permitted, if facility in coupling cars on all ordinary curves is desired, because much lateral clearance interferes with coupling where two cars come together at an angle to each other. In such cases the couplers will slide past each other instead of coupling. It appears from this that each case must be treated by itself, and some provision should be made for additional lateral movement when cars are coupled together which vary greatly in wheel base and overhang of the coupler beyond the wheel base.

The Time Convention and Block Signals.

The General Time Convention, which meets in New York next Wednesday, is likely to find itself—like its satellite, the Superintendents' Association—without any topic of absorbing importance. President Haines delivered an important and suggestive address at the last meeting, but its subject matter covered such a very large field that the very bigness of the problem hinders prompt action. Both of these associations seem to be drifting toward mechanical subjects, and this in spite of the fact that those subjects are pretty well taken care of in the distinctively mechanical conventions. The General Managers and Superintendents have, in a sense, more important affairs to attend to than mere mechanical details, and those larger matters are the things they should take up. Even if we admit the propriety of making "Safety Appliances" the principal topic before the Time Convention, it is to be remembered that this one division of the subject has already shown itself to be so unwieldy that the standing committee having it in hand has not seen its way clear to recommend any definite action.

The principal safety devices now before the railroad world are brakes, couplers, and signals. The first two have been so well discussed elsewhere that really only the last named is left for the managers' meeting. The general subject of signaling is, however, one of the most legitimate topics that could be brought before these men, because it includes management of men and methods of working, these being, in fact, equally important with the mechanical side of the question. There are numerous practical superintendents in the Time Convention who can discuss signaling with great profit, if they will; but even if we assume that this body is only for the General Managers—some of whom are not familiar with all the details of train handling, and nearly all of whom are pressed with numerous other matters—it still has the duty of discussing the subject we are now speaking of, for the reason that the Superintendents' Association is not yet large enough to have the influence it ought to have. If the managers will not send their subordinates to the lower association, they should cover the field in the higher one.

As an illustration of the difficulty of arousing interest in a convention with merely mechanical safety devices, it may be observed that one of the most dangerous features of a railroad is a facing-point switch, and that one of the simplest and most valuable "safety devices" is a trailing-point; and yet many roads could spend a good share of their spare funds, for a year or two at least, in changing cross-over tracks simply to correct this one evil. There is, therefore, much sense in the view of those who hold that less study and more practice of the lessons already learned is the necessity of the day. But assuming that methods rather than "devices" are the legitimate subjects for discussion by a body like the Time Convention, why not take up a topic which can be profitably considered without stepping out of that field? To avoid waste of energy on a multiplicity of subjects, let us take only one, block signaling. A good deal may be said about that without touching mechanical details at all. The *Railroad Gazette* record of train accidents for August shows 35 rear and 31 butting collisions. At least half of each of these classes were clearly preventable by the use of the cheapest kind of a block system, and it is more than likely that half of the remainder would have been prevented by the same means. Even admitting that some of the mistakes made by operators and others are possible under a block system, it remains true that the better discipline which is possible under that system tends strongly to prevent blunders. Prevention of small blunders, either by making them impossible or by more effective punishment of the perpetrators, certainly lessens the number of greater ones. The September records will be distinguished by one of the worst accidents of the year, which it is practically certain would have been prevented by a block system. It is true that other precautions would have been in order and would have been valuable here as in most bad accidents; but perhaps too much attention to apportioning responsibility among a number of different men or departments is one reason why better progress is not made in eradicating the causes of the horrible

and disgraceful accidents which so frequently mar the railroad record of this country. It may be better to confine attention for a while more closely to one class of causes. In addition to the Shoemakersville collision the September record will show four rear and two butting collisions, which killed nine persons, besides causing many thousands of dollars damage to property, and which were preventable in the same manner as the others which we have referred to.

Perhaps the Time Convention could not do better than to imagine itself being interrogated, as a body, by a government inspector clothed with authority like that exercised by the officers of the British Board of Trade, whose valuable work is frequently set forth in the columns of this paper. Such an officer might ask a great variety of questions which would come home to individual members, and which they would do well to look at from his point of view. Take, for instance, the following:

Do you think a block system more efficient than the flagging system in preventing rear collisions? If not, have you carefully investigated the practice of the Pennsylvania, the West Shore and other roads, some of which do not spend enormous sums of money on this work?

Do you regard the block system as impracticable or of trifling value as a preventive of butting collisions on single track? If so, have you posted yourself as to what the Chicago, Milwaukee & St. Paul and other roads have learned by experience in this line?

What is the average annual cost of collisions on your road? How thoroughly have you compared this with the probable cost of a block system? When public sentiment censures railroads for killing passengers or employés do you present this comparison to your directors, backed up by a vigorous statement of your views?

Do you notice that with the increasing weight of engines and trains and the growing necessity for fast time, the average expense of train accidents is increasing?

Do you realize that your freight trains are daily following one another within less than five minutes, and that this leaves such a small "margin of safety" that our comparative immunity from rear collisions may be regarded as largely the result of "good luck"?

Have you not many sections of road where stations already established are near enough together to block trains a station apart and still allow them to follow at intervals of 12 minutes, and in many cases 10 minutes or even less? Can you safely run them any closer than this, in foggy or stormy weather, under any system?

Do you keep your mind "loaded" with facts, and your pocket memorandum with figures, so as to present these questions to the directors in a strong light every time there is a chance?

As above intimated, these are only sample questions. That the whole subject should be most carefully studied will become apparent to any one who realizes how fast our traffic is growing and who will heed the lessons of experience. The superintendent of a large English road said recently in a private letter that, although the freight trainmen there were, prior to the introduction of the block system, trained in the most strict manner to go back instantly in case of any unusual stoppage, "rear collisions were of almost daily occurrence," while "now they are almost unknown."

Maximum Curvature Which a Given Locomotive Can Pass.

We have received several inquiries for some simple means of determining by calculation the sharpest curve which a given locomotive can pass. It is customary in most cases to lay out a curve to scale and determine the angular position of the locomotive, and in that way the smallest radius of curvature feasible with a given design. Owing to the small scale on which the work has to be done, it is doubtful if laying out is any more accurate than an approximate calculation. Both "lay-outs" and calculations are necessarily limited to the known conditions, whereas in actual trial a locomotive may pass a sharper curve than preceding investigations would indicate; the slight bending of the frames and the flexibility of the parts materially assist. In the rule given below the bending of the frames and the flexibility of the parts are not taken into account, but may be by simply increasing the figures taken for the lateral motion. This will be further explained.

The mathematically correct analysis of the position of a locomotive on a curve is very complicated, and the formula for the minimum radius is too unwieldy for ordinary use. From it can be discarded a large number of terms which have a value too small to be of any moment on curves of ordinary radius. The simplest solution of this problem—leaving out the considerations just mentioned, which are too small to be of practical value—is found in its elementary form in a geometrical problem. (See Olney's "Elements of Geometry and Trigonometry," University edition, page 253.) "In any triangle the rectangle of two sides is equivalent to the rectangle of the perpendicular let fall from their included angle upon the third side, into the diameter of a circumscribed circle." Perhaps a simpler way of stating this is as follows: The product

of any two sides of a triangle is equal to the product of the diameter of the circumscribed circle and the perpendicular upon the third side drawn from the opposite angle.

When a locomotive is standing on a curve, if it have three pairs of wheels the total wheel base may be considered one side of the triangle. It also may be considered as the chord of minimum curvature. The other two sides of the triangle are formed by the two intermediate wheel bases. The amount of lateral motion in the engine is the perpendicular let fall upon the third side. Here there are three known quantities from which the radius of the curvature may be determined. Three points determine the position of a curve, and if a locomotive has more than three pairs of flanged wheels, then there may be several different minimum curvatures, depending upon which set of three pairs is considered. For any design having

more than three pairs of wheels, each should be considered separately. This will be more clearly shown by the diagram herewith, in which A, B and C are the three drivers on the curve, and D and E the intermediate wheel bases. The line B F is the perpendicular to the third side, and B G is the diameter of the circumscribed circle. D and E are known from the design of the engine. B F is made up of several factors, as follows:

One-half of the lateral motion at A and C (provided the lateral motion at these points is identical), one-half of the lateral motion at B, the spread of the rails on the curve beyond the standard gauge, the lateral motion in the driving wheel boxes, and a factor representing the reasonable bending of the engine frames. If a different lateral motion is given to the drivers at A from that at C, then a correction has to be made for this difference, as follows: If A, B and C, respectively, represent the lateral motion at these points, including, of course, the spreading of the rails on the curve, and D and E the wheel bases, as above stated, and L be the lateral motion in the driving boxes, the general formula for the total lateral motion—which is assumed to be the length of the perpendicular B F—is

$$\frac{1}{2}A - \frac{1}{2}C - E + \frac{1}{2}B + L + \text{bending of frames.}$$

Let this offset or total lateral motion be represented by O, then the minimum radius of curvature, around which the locomotive can pass, is as follows:

$$D \times E$$

$$20$$

The written rule, then, is multiply the two intermediate wheel bases together and divide by twice the total lateral motion—all to be expressed in feet. The result will be the minimum radius of curvature.

The extreme simplicity of this rule renders it useful, even if it is only approximate. However, it must be stated that the formula is probably more accurate than any system of laying out on paper, particularly on curves of large radius. As before stated, this formula should be applied to every combination of three pairs of flanged drivers when the locomotive has more than three pairs, such as consolidations and decapods. The result should be obtained for each of the different sets and compared with each other. The maximum only should be taken of these results.

August Accidents.

Our record of train accidents in August, given in this number, includes 85 collisions, 82 derailments and 11 other accidents, a total of 178 accidents, in which 100 persons were killed and 292 injured.

These accidents are classified as follows:

COLLISIONS:

| | |
|---------------------------------|----|
| Rear..... | 35 |
| Butting..... | 31 |
| Crossing and miscellaneous..... | 19 |
| <hr/> | |

DERAILMENTS:

| | |
|-------------------------------------|----|
| Loose or spread rail..... | 4 |
| Broken bridge..... | 2 |
| Defective switch..... | 4 |
| Broken wheel..... | 3 |
| Broken axle..... | 5 |
| Broken truck..... | 2 |
| Fallen brakebeam..... | 1 |
| Broken car..... | 2 |
| Misplaced switch..... | 3 |
| Runaway train..... | 4 |
| Obstruction by track repairers..... | 1 |
| Cattle on track..... | 6 |
| Washout..... | 1 |
| Landslide..... | 3 |
| Malicious obstruction..... | 5 |
| Accidental obstruction..... | 3 |
| Purposely misplaced switch..... | 2 |
| Unexplained..... | 31 |
| <hr/> | |

OTHER ACCIDENTS:

| | |
|--|---|
| Broken parallel or connecting rod..... | 1 |
| Boiler explosion..... | 2 |
| Miscellaneous..... | 8 |
| <hr/> | |

Total number of accidents.....

The causes of collisions, where given, were as follows:

| | Rear. | Butting. | Crossing and other. | Tot'l. |
|--|-------|----------|---------------------|--------|
| Trains breaking in two..... | 3 | 3 | 4 | 6 |
| Misplaced switch..... | 3 | 3 | .. | 1 |
| Failure to give or observe signal..... | 1 | .. | .. | 1 |
| Mistake in giving or understanding orders..... | 1 | 3 | .. | 4 |
| Miscellaneous..... | 12 | 7 | 6 | 25 |
| Unexplained..... | 15 | 15 | 9 | 39 |
| Total..... | 35 | 31 | 19 | 85 |

A general classification shows:

| | Collisions. | Derailments. | Other. | Total. | P. c. |
|------------------------------|-------------|--------------|--------|--------|-------|
| Defects of road..... | 10 | 10 | 10 | 6 | 6 |
| Defects of equipment..... | 6 | 13 | 8 | 27 | 16 |
| Negligence in operating..... | 40 | 8 | 1 | 49 | 28 |
| Unforeseen obstructions..... | 20 | 2 | 22 | 12 | 12 |
| Unexplained..... | 39 | 31 | .. | 70 | 38 |
| Total..... | 85 | 82 | 11 | 178 | 100 |

The number of trains involved is as follows:

| | Derailments. | Collisions. | Other. | Total. | P. c. |
|------------------------|--------------|-------------|--------|--------|-------|
| Passenger..... | 38 | 22 | 6 | 66 | 23 |
| Freight and other..... | 132 | 60 | 5 | 197 | 73 |
| Total..... | 170 | 82 | 11 | 263 | 100 |

The casualties may be divided as follows:

| | Collisions. | Derailments. | Other. | Total. |
|-----------------|-------------|--------------|--------|--------|
| KILLED. | 29 | 33 | 3 | 65 |
| Employés..... | 29 | 33 | 3 | 65 |
| Passengers..... | 6 | 23 | 1 | 30 |
| Others..... | 3 | 2 | .. | 5 |
| Total..... | 38 | 58 | 4 | 100 |

| | INJURED. | Collisions. | Derailments. | Other. | Total. |
|-----------------|----------|-------------|--------------|--------|--------|
| Employés..... | 96 | 85 | 5 | 196 | 196 |
| Passengers..... | 36 | 53 | 3 | 92 | 92 |
| Others..... | 2 | 2 | .. | 4 | 4 |
| Total..... | 134 | 150 | 8 | 292 | 292 |

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

| | Pass. killed. | Pass. injured. | Emp. killed. | Emp. injured. |
|--|---------------|----------------|--------------|---------------|
| Defects of road..... | 2 | 3 | 3 | 25 |
| Defects of equipment..... | 1 | 8 | 3 | 9 |
| Negligence in operating..... | 29 | 80 | 35 | 102 |
| Unforeseen obstructions and maliceousness..... | .. | .. | 10 | 26 |
| Unexplained..... | .. | 2 | 11 | 34 |
| Total..... | 30 | 92 | 65 | 196 |

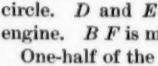
Forty-five accidents caused the death of one or more persons, and 54 caused injury but not death, leaving 79 (44 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with August of the previous years shows:

| | 1890. | 1889. | 1888. | 1887. |
|------------------------------------|-------|-------|-------|-------|
| Rear collisions..... | 35 | 40 | 43 | 30 |
| Butting " | 31 | 32 | 30 | 34 |
| Crossing and other collisions..... | 19 | 9 | 15 | 1 |
| Derailments..... | 82 | 82 | 121 | 64 |
| Other accidents..... | 11 | 6 | 13 | 8 |
| Total..... | 178 | 169 | 222 | 137 |
| Employés killed..... | 65 | 28 | 43 | 45 |
| Others..... | 33 | 23 | 13 | 84 |
| Employés injured..... | 196 | 122 | 100 | 89 |
| Others..... | 96 | 131 | 102 | 234 |
| Passenger trains involved..... | 66 | 66 | 77 | 51 |
| Average per day : | | | | |
| Accidents..... | 5.74 | 5.45 | 7.16 | 4.42 |
| Killed..... | 3.23 | 1.64 | 1.77 | 4.16 |
| Injured..... | 9.42 | 8.16 | 6.54 | 10.42 |
| Average per accident : | | | | |
| Killed..... | 0.562 | 0.301 | 0.248 | 0.911 |
| Injured..... | 1.649 | 1.496 | 0.914 | 2.358 |

This was the worst August since 1887, when the Chatsworth disaster occurred. The worst disaster of the month was that at Quincy, Mass., on the 10th, which has been discussed in previous issues. One more of the injured passengers died Sept. 12, making the total number of fatalities 22. Six other train accidents during the month caused the death of one or more passengers each. One of them, at Mullen, Neb., the 25th, was to a freight train, and that at Shelbyville, Ind., the 22d, was doubtless under similar conditions. Three passengers were killed by the disaster at Reading, Pa., on the 22d, though there may be a question whether that disaster ought to be included among "railroad accidents," any more than the occasional runaways of electric street cars. The other fatalities to passengers occurred at Hannibal, Mo., on the 2d, Garrison, Mont., on the 16th, and Guthrie, Ind., the 3d. A comparatively slight collision on the Chicago & Northwestern on the 7th resulted in the death of Mr. G. W. Tilton, Superintendent of Motive Power and Machinery of that road. We have classed this death among those of employés.

The collision at Guthrie was caused by both the engineer and conductor of the passenger train going to sleep. The engineer had, indeed, placed the engine in charge of the fireman, but he seems not to have informed the latter about the telegraphic orders which he held. This accident was one of a series which have followed one another quite rapidly on that road; they were, in fact, so numerous as to cause considerable newspaper comment. An officer of the road is reported as saying that the accidents resulted from negligence which could not be foreseen or prevented. So far as can be judged by the accounts published, most of them were caused by that class of blunders which are generally found to be susceptible at least of abatement, and every one knows that 90 per cent. (and probably 99 per cent.) of our collisions between stations could be prevented by the block system. As regards this last case, it is first to be noted that a conductor or an engineer who goes on duty when he is so tired as to be likely to fall asleep is individually blameworthy. There is much to be said in favor of the theory that he is guilty of an actual crime, for his experience tells him that constant alertness is his only safe mental attitude. At the same time, the temptation to make extra trips for the purpose of increasing the



month's wages is so strong, and the weakness of human nature is so well known, that a definite moral responsibility rests upon the manager who does not take measures to systematically guard against sending out trains with sleepy men in charge of them. Trainmasters who are overanxious to keep down the expense account often encourage men to overwork themselves, though they do it by such insidious methods as to silence their own consciences. The case of a conductor who deliberately places the train in charge of a brakeman and proceeds to take a nap is not precisely similar to the above, and may have some excuse, but this practice, which is doubtless common, also deserves more attention from managers. When an engineer has to sleep on the engine, even with an intelligent fireman "on deck," it is high time the company discharged the man or reformed its hours of working him.

The disaster to a passenger train at Augusta, Mich., on the 15th was one of the worst of the month, though no passenger was killed. It is said that in this case a station employé stood near the misplaced switch and waived a white flag to the engineer as a signal that the switch was right. This is only one more illustration added to very many previous ones of the inadequacy of that method of securing the safety of trains at switches. It is said that the baggage car in this train at once took fire, apparently from friction. One of the freight cars was loaded with explosives, which were scattered about, but fortunately not exploded. The moral of misplaced switch accidents has been so often stated in these columns that it should need no repetition here; but it should be remembered that the force of that moral is constantly augmenting because of the increase in weight and speed of trains. Observant managers notice that the average cost of train accidents is constantly rising as cars become heavier and carry more valuable loads, so that on mere financial considerations the duty of preventing collisions and derailments is more and more pressing. There are roads in this country that run fast and heavy passenger trains with a high degree of safety, and there are also roads operated with unprotected switches, also with a high degree of safety; but experience is constantly teaching us—if we are so dull as not to know it without further teaching—that these two conditions cannot be combined. If trains are to make quick time, switches must be protected. If distant signals are not put in trains must run more slowly. Any evasion of this obstinate fact results simply in gambling against fate, and the game is one in which the passengers are always the losers. An interlocked distant switch signal costs not over \$100 at the outside, a sum which could probably be multiplied by all the facing points on the Michigan Central road, and then not greatly exceed the cost of this one wreck; possibly it would fall short of it.

Among the disasters from freight wrecks of the month were those at Summit, Cal., on the 22d, Varelo, Col., on the 18th, and Fishers, N. Y., on the 11th, killing four, seven and three employés respectively. The last named, a butting collision, was investigated by the coroner's jury, which laid the blame on a train dispatcher. The evidence as published, which is not very clear, indicates that the New York Central does not avail itself of the great safeguard afforded by the duplicate order system.

It will be noticed that the butting collisions at Howe, Tex., and Duckers, Ky., are said to have been the result of a train trying to make a certain station on the time of another. While American railroading in general is sufficiently faulty and in need of improvement, it may be well to comfort ourselves with the fact that such absolute recklessness as this is growing less common on the older roads. When we look at the official record of safety on the roads of the United States as a whole it should be borne in mind that the general average, as it would appear on the great bulk of the roads, is reduced considerably by the recklessness prevalent in some of the regions where good help is not readily obtainable.

Near Champaign, Ill., on the 17th a locomotive runner became suddenly insane while running. A lamp exploded in a sleeping car at Actonvale, Ont., on the Grand Trunk, and the car was completely destroyed, but none of the passengers, Grand Army delegates on the way to Boston, were injured. A cigarette thrown upon the floor of a caboose was the indirect cause of a bad collision at Reverse, Idaho, on the 3d.

We are informed by an officer of the Denver & Rio Grande that the report of two derailments on that road July 6, near Carracas, was unfounded. The alleged cause was a runaway train, the brakes becoming useless on a descending grade by reason of the wheels having been lubricated by locusts which had swarmed on the track and been crushed by the wheels. The report bore some signs of being a "fake," but the calamity clerk in this office, not being familiar with the habits of Rocky Mountain locusts, failed to scrutinize the statements carefully. The crop of yarns of this kind seems to be quite regular and persistent in the West. One of them recently told of a bad freight wreck on the Atlantic & Pacific which caught fire and made things so desperate that casks of California wine had to be used to extinguish the flames, while silk from China was used in lieu of blankets for smothering the fire.

The Superintendents and Division Superintendents located at Denver have formed a Superintendents' Association, which will soon go into operation. It differs

from most organizations of the kind in that the by-laws provide for admitting shippers and other patrons of the roads to membership. It appears that the local switching service in that city has been very defective for a long time and that complaints from people shipping and receiving bulk freight have therefore been very loud and very numerous. The present scheme is apparently intended to facilitate the adjustment of these controversies. Evidence that the switching service was bad would seem to be afforded by the frequent reports of strikes in that locality. Men who make new complaints every few weeks and who seem to have a chronic feeling that they must dictate to the yardmaster instead of submitting to dictation by him must be poor workmen for legitimate business. The fact that the exigencies of the business compel the Division Superintendents to deal directly with consignees illustrates the necessity of locating division freight agents with as much care as is given to the operating department, and also indicates that there should be as many of the one class of officers as of the other. The widespread consolidations which have affected railroad management all over the country of late years have been constantly removing the general officers farther and farther away from the great majority of the patrons of the road. In the operating department this has been partially compensated for by giving division officers increased authority, but the traffic department probably has not been so well or so rapidly adapted to the changed conditions. We should say that the Denver Superintendents had better leave the business of negotiating with shippers and consignees to the local agents and devote their own spare energies, if they have any, to strengthening the arms of the latter.

The rear collision of passenger trains at Chicago, Sept. 21, briefly noticed in these columns last week, was on the main line of the Chicago, Burlington & Quincy near Kedzie avenue, about four miles from the Central station. C., B. & Q. train 134, moving about 15 miles an hour, ran into the fourth section of an Illinois Central excursion train. The block system is in use on this part of the road, and, if we remember correctly, the line is perfectly straight. A coroner's jury has rendered a verdict blaming both companies and the employés of both trains, but referring the matter to the state's attorney for presentation to the Grand Jury. This course is taken because the testimony is so conflicting that the jury is unable to sift it. Evidently the Burlington train was admitted to the block section under a caution signal, and the rules of the road say that in this case the train "must proceed expecting to find a train" in the block; but, as the rules also state that trainmen are not relieved from flagging under the general rules, the engineer can, of course, place whatever construction he pleases on the phrase we have quoted. He can, with a good deal of reason, assume that where the preceding train is, say, two minutes ahead of him it will, if stopped, have a red signal back several hundred feet. The evidence seems to indicate that the rear brakeman of the Illinois Central train made no attempt to go back with his red light, justifying his conduct by claiming that the Burlington trainmen do not customarily go back with danger signals where the block system is in use. The Illinois Central train had been stopped some minutes and had just started, so that, judging by the custom (not the rules) of some prominent roads which use the block system, the brakeman would in this case very likely have been on the train at the time of the collision even if he had gone through the formality of going back a short distance immediately after the stoppage of the train. As the facts will probably be more accurately reported hereafter we refrain from further comment.

A newspaper item has been published to the effect that the Norfolk & Western has recently pensioned on full pay four of its oldest passenger conductors, in consideration of their long and faithful service to the company. As complete retirement on full pay is very unusual, we inquired of an officer of the company concerning this report, and were informed by him that it is based merely on the usual custom of the company, similar to that in force on numerous other roads, to give their old and faithful employés easier positions. "The company does not use its men until their day of usefulness is past and then turn them loose on the world, but rewards their services by giving them some easier position where they can still render service and feel that they are useful. For such service they are paid good wages, commensurate with what they have been receiving."

It is to be hoped that acts of this kind will become more common and be made the subject of more systematic regulations. While there is much to be said both for and against a "paternal" system, whereby a rich employer "looks out for the rainy day," instead of according to his employés the privilege of saving (or spending) their money themselves, it is greatly to be desired that more attention be given to the general subject. While American railroad officers are to be credited with thousands of benevolent acts of this kind toward their subordinates, hardly any individual officer possesses accurate knowledge of what other railroads do in the same line, and the method of applying the common principle therefore varies widely in different cases.

The Pennsylvania and Baltimore & Ohio have already made considerable progress toward systematizing this matter, and apparently aim to do much more. The Adams Express Company retires old and faithful employés on full pay with no work, but as there is a fixed rule in the matter, which only goes into effect after 40 years' continuous service, this apparently liberal arrangement has thus far been enjoyed by only a very few individuals. If a man in his thirty-ninth year leaves the service of the company he is debarred from participation in its benefits, even if he returns the next day.

NEW PUBLICATIONS.

American Rail-way Master Mechanics' Association. Proceedings of the Twenty-Third Annual Convention, 1890.

This report appears with the promptness which has been noticeable in recent years. It contains the papers and discussions which were printed at more or less length in the *Railroad Gazette* at the time of the Convention, with a very good index.

Journal of the Association of Engineering Societies for August, 1890.—The papers are: Ferroid, a New Artificial Stone, by Herman Poole; Compound Locomotives, by Arthur T. Woods; The Pemberton Concentrator, by Frank Nicholson, and the Eiffel Tower from Foundation to Lantern, by Ambrose Swasey. The usual Index to Current Literature is continued. John W. Weston, Secretary, 78 La Salle street, Chicago.

TRADE CATALOGUES.

Catalogue of Keuffel & Esser Company, New York. Twenty-first edition. Price 50 cents.

This is a large and very handsome catalogue of the draughtsmen's and engineer's instruments supplied by this well-known house.

Illustrated Price List of Scales, Engines and Boilers, Steam Pumps, Barrows, Water Tanks, etc. Fairbanks, Morse & Co.

This is a catalogue of 428 pages, containing price lists of an immense variety of materials. The offices of the company are to be found in Chicago, St. Louis and nine other principal Western cities.

Illustrated Catalogue of the Berlin Iron Bridge Co., East Berlin, Conn.

This is a considerably larger catalogue than the one noticed in the *Railroad Gazette* a few months ago. It contains illustrations of a number of very interesting structures in the way of iron roofs for machine shops, rolling mills, gas houses, car sheds and other buildings. Several recent bridges built by the company are also illustrated. One of the most interesting structures shown is the foundry building of the Farrel Foundry & Machine Co., at Ansonia, Conn. The building is 302 x 129 ft., with two traveling cranes of 50 tons capacity travelling the full length of the foundry on latticed girders. The girders are carried on cast-iron columns placed 50 ft. apart. Between these columns are to be placed jib cranes, secured to the lower flange of the girders. The strain from the cranes is carried entirely by the iron work independently of the walls and buildings.

Railroad Advertising.

THE GENERAL PASSENGER AGENTS' ASSOCIATION. The official report of the thirty-fifth convention of the American Association of General Passenger and Ticket Agents, which was held at Denver, Sept. 16, shows that 54 of the 161 members were present. The committee appointed to consider the question of a national telegraphic code reported it inexpedient to formulate such a code, and the committee was discharged. The principal feature of the meeting was an address by Mr. E. O. McCormick, of the Cincinnati, Hamilton & Dayton, on advertising. The address was full of excellent suggestions on this rapidly growing art, and is well worth reading. We summarize its salient features:

Flyers are necessary, especially for excursions, but if got up in good style, as they ought to be, are expensive. Window hangings are good in large towns, where merchants are careless enough to allow the theatrical bill-posters to fill their windows with such matter when they might just as well use the space to better advantage for displaying their own wares. Pamphlets are good, especially for summer or winter health resorts. But of all printed matter distributed by railroads the folder is the best. A Southern road once issued so excellent a map-folder that passengers traveling on competing lines used it for reference. Pocket memorandum books and other novelties are expensive, but are generally carefully kept by the recipient. The speaker was in favor of wall advertising where the location is favorable and the painting is done artistically. But newspaper advertising is far more important than all other methods put together. Railroad men do not appreciate the value of this, and fail to exercise the care in wording their advertisements that is demanded by the actual value of the space employed. The art of conciseness should be studied very much more than it is. Variety is essential to the best results and every advertisement should be a new one; that is, nothing should be allowed to appear time after time in the same shape till people become sick of it. The fact that newspaper advertising is paid for in passes instead of money makes us careless of its value.

The next meeting of the Association will be at San Francisco, March 17, 1891.

TECHNICAL.

Manufacturing and Business.

Mr. James B. Brady, who has for a long time been connected with Manning, Maxwell & Moore, will also travel for the Fox Solid Pressed Steel Co. This will be in addition to his former business, as his connection with the house of Manning, Maxwell & Moore will remain the same.

The Coburn Trolley Track Manufacturing Co., of Worcester, Mass., has recently received orders from various roads aggregating 17,400 of their freight car doors. Several important improvements have been made upon this door since it was shown at the Old Point Comfort conventions. The company has shipped car-door fixtures for 40 doors to the Gloucester Carriage & Wagon Co., of Gloucester, Eng., ordered for trial on a lot of 300 cars now being built by English manufacturers for a South American railroad. The company is also shipping fixtures for 1,600 car doors to the United States Rolling Stock Co.'s car shops at Anniston and Decatur, Ala., for the Georgia Southern & Florida cars.

The Indianapolis Frog & Switch Co. is enlarging its plant, and will put in a large amount of new machinery. This company, in addition to the specialties heretofore manufactured, will soon have an interlocking system perfected.

The National Electric Headlight Co., of Indianapolis, has equipped two locomotives on the Chicago division of the Louisville, New Albany & Chicago road.

Gould & Eberhardt, of Newark, N. J., have recently booked orders for the automatic gear cutter machines to Westinghouse Electric Co., Prentiss Bros., and F. E. Reed, and a car load is ready for the McGill University, at Toronto, Can., besides a number of foreign shipments.

The Tripp Manufacturing Co., of Boston, manufacturers of electric car trucks, is to double its capacity and otherwise enlarge its plant. This plan will be immediately carried into effect, and the force largely increased, which will enable the firm to fill all orders without delays.

The Fox Pressed Steel Co. will remove its office from Chicago, on Oct. 18, to Joliet, Ill., where its plant is located.

M. T. Davidson, Brooklyn, has recently shipped eight Davidson pumps to Havana, Cuba, and also eight to Rio Janeiro, Brazil. It is not a very long time since he shipped 47 of these pumps to San Francisco, Cal.

The Lynn Belt Line Street Railroad Co., of Lynn, Mass., reports that charging all coal used in a day's run of 18 hours gives a cost of only 1.18 cents per car per mile. The company uses the water-tube steam boiler, manufactured by the Abendroth & Root Mfg. Co., of New York City. A number of these boilers have been adopted by cable and electric street railroad companies.

The McCormick Construction Co., of St. Louis, has been organized with a capital stock of \$50,000. The incorporators are John B. O'Meara, F. P. McCormick and Richard P. McCormick, of St. Louis.

The C. W. Melcher Machinery Co., of St. Louis, sold this week two 70 h. p. portable boilers, to be used in connection with two 16 x 18 Ingersoll air compressors in sinking caissons for the St. Louis, Arkansas & Texas Railroad bridge across the Arkansas River. The company shipped this week a large Ingersoll drill to South Dakota for railroad work.

The Ross Valve Co., of Troy, N. Y., has increased its capital stock to \$40,000, and will enlarge the factory.

The contract for furnishing the tools and machinery for the Tacoma shops of the Northern Pacific has been let to Messrs. Manning, Maxwell & Moore, of New York.

Bement, Miles & Co., of Philadelphia, will shortly erect a four-story machine shop.

A sash holder made by the Richmond Sash Holder Co., of Richmond, Va., has been tried recently on a number of cars of the Richmond & Danville and other Virginia roads. It is reported to have been found very satisfactory. Among the stockholders of the company are Sol. Haas, R. D. Carpenter, S. H. Bowman, William Ryan, J. H. Drake, John F. Mayer and George J. Hooper, Jr. The officers are: S. H. Bowman, President; A. L. Wilkinson, Sr., General Manager; John F. Mayer, Treasurer; George Crutchfield, Secretary.

Iron and Steel.

A notice incorporating the Toronto Rolling Mill & Forging Co. with a capital stock of \$200,000 was filed last week. The works will be located at West Toronto Junction, and will employ 100 men at first. The town will be asked to grant a bonus of \$20,000.

Carnegie, Phipps & Co. to-day have announced an advance of 5 $\frac{1}{2}$ per cent. in the wages of the 1,500 employees of the Homestead steel mill, to take effect at once. This advance is made under the terms of the sliding scale agreement, by which wages are regulated according to the market price of steel.

McGill & Co., of Pittsburgh, are building hydraulic machinery to turn the 18-ton converters being built for the Pennsylvania Steel Company's plant at Sparrow's Point, Md. The cylinders are 16 ft. 8 $\frac{1}{2}$ in. by 13 in. diameter and the piston rod is 20 ft. 1 $\frac{1}{4}$ in. by 6 in.

The Pittsburgh Steel Casting Co., of Pittsburgh, last week made a Bessemer steel casting for the main shaft for the Riverside Iron Works, which weighs in the rough 21,000 lbs. The shaft weighs about 33 per cent. more in the rough than the gun casting for the Hainsworth gun, which was also made by this company.

The Bethlehem Iron Co. has called a meeting of the stockholders to consider a proposition to increase the capital stock from \$3,000,000 to \$5,000,000. The proposed increase is to be spent in enlarging the company's plant, which includes the new ordnance works, where armor and gun steel are being turned out for the government.

Wm. Swindell & Bros., of Pittsburgh, Pa., have received the contract for the equipment of the new puddling department of the Lockhart Iron & Steel Co. This addition is to contain 11 Swindell puddling furnaces and one regenerative gas heating furnace. The firm has received the contract for the erection of four steel heating furnaces at the Dexter Spring Co.'s Works, at Verona, Pa.; one double steel heating furnace for the A. French Spring Co.; one annealing furnace for the Pittsburgh Steel Casting Co.; two soaking pits for the Hainsworth Steel Co., and one 7-ton air furnace for the Johnson Foundry Co., Johnston, Pa.

This week the name of the Chester Rolling Mill Co., of Thurlow, Pa., was changed to the Wellman Iron & Steel Co., and the capital increased from \$600,000 to \$1,000,000. The increased capital is to be used in improving the

works and for new machinery and furnaces for manufacturing the finest quality of steel. The officers of the new company will be as follows: S. T. Wellman, President; William G. Neilson, Vice-President; John P. Crozer, Treasurer, and Richard Peters, Jr., Secretary. The plant consists of one blast furnace of 17 ft. bosh, 72 ft. high; two 15-ton open-hearth furnaces, well equipped with hydraulic cranes, etc. The Bessemer plant consists of two 3-ton converters. The blooming mill is in connection with the Bessemer plant, and is a reversing mill with 30-in. rolls. The plate mills consist of a two-high train with 30-in. rolls, 80 in. and 100 in. long; a 25-in. three-high mill with 72-inch rolls. A larger three-high mill will be added immediately. There are also 11 double puddling furnaces for producing puddled bar for iron plates.

New Shops.

The New York, Susquehanna & Western has purchased a ten-acre tract of land three-quarters of a mile west of Hawthorne, N. J., on which will be erected next spring four new shops, larger than those now used at Wortendyke. The Wortendyke shops will then be abandoned. Tracks will be built to the new plant from the new River-side terminal. It is estimated that the plant will cost \$100,000.

The New York, Lake Erie & Western is enlarging its yard at Middletown, N. Y., and making other improvements. The old Taylor House in the yard opposite the station has been purchased for \$15,000 and torn down. A new freight house will be built on Union street at a cost of \$6,000. The present passenger station is to be remodeled and the floor raised at a cost of about \$5,000. The turntable in the upper end of the yard has been abandoned to give additional room. The company has purchased a strip of land containing 2 $\frac{1}{2}$ acres at Middletown Summit, and a Y has been built on it for engines to turn. The new yard when completed will contain eight tracks with a capacity for 150 freight cars. The company will erect gates at all the street crossings in the city. The yard tracks are nearly completed. About \$50,000 will be expended on the improvements.

The Minneapolis & St. Louis is building a locomotive shop at Cedar Lake, Minneapolis, which it is expected to have completed by next January. At present all the foundation work has been completed. The work is being done under the direction of W. H. Whitaker, Acting Master Mechanic.

Interlocking.

The three towers which are to be erected in the Jersey City yard of the New York, Lake Erie & Western will contain Johnson interlocking machines of the following sizes: One 64 lever, one 28 lever and one 16 lever.

The Central Railroad of New Jersey has contracted with the Johnson Railroad Signal Co. to put in that system of interlocking at Easton and Phillipsburg.

The New York, Ontario & Western is protecting its grade crossings with interlocking by the Johnson Company. The diamond crossing at Scranton is just being completed.

A Long Railroad Pier.

Two years ago Mr. Murphy, of Ontario, was awarded the contract for constructing a wharf or pier off Cape Tormentine, at the terminus of the New Brunswick & Prince Edward Island railroad. The work when completed will be an embankment of solid stone, 1,200 ft. long, to which will be added 1,200 ft. of crib work, the whole extending eastward into the strait. Then from the outer end it will be continued southerly 400 ft. and parallel to the shore. From that point it will run westerly 400 ft., making in all 3,200 ft. Already the first part has been finished, together with 900 ft. of the crib work. The stone for ballasting is brought by train from a quarry 18 miles inland.

A French Passenger Engine.

The Western Railroad Company of France is about to put in service, for one of its fast Paris trains, a new type of locomotive. *Le Génie Civil* describes it as an eight-wheel engine of exceptional power, capable of pulling a 24-car train at a speed of about 47 miles per hour. The locomotive is about 10 feet longer than the present express engines of the road, and its four drivers are 7 $\frac{1}{4}$ ft. in diameter. The tender capacity is such that the engine can take a train over a distance of 76 miles without stopping to take in water.

Ferroid, a New Artificial Stone.

Under this title Mr. Herman Poole describes in the *Journal of the Association of Engineering Societies* a new artificial stone, which is a compound, partly chemical and partly mechanical, of iron, sulphur and silicon, with more or less foreign matter. It is mainly a super-saturated solution of iron in the sulphur with the silica acting as a binder and hardener. Its normal color is a dark slate, varying somewhat with the manner in which it is dressed, but the color can be somewhat modified by the introduction of pigments. Successful imitations of various colored brick and sandstone have been made. It is about the hardness of ordinary bluestone and can be worked by the usual stone cutting tools, turned in a lathe, or planed. The tensile strength is from 650 to 1,200 pounds per square inch, and under compression it resists from 9,000 to 12,000 pounds. Its specific gravity is about 2.6. It melts at about 300 degrees F. very slowly. It does not deteriorate under exposure to the weather.

It does not deteriorate under exposure to the weather. As it can be melted and molded it is applicable to a great variety of uses to which stone cannot be put, and particularly so for large castings, such as pipes for sewage, etc. Architectural forms can be very conveniently made from it in position if needed. For culverts and bridge foundations the perfect smoothness of which the surface is susceptible is advantageous in lessening water friction.

A Student's Prize at the R. P. I.

An annual prize of \$120 has been established by Chas. Macdonald, of the Union Bridge Co., at the Rensselaer Polytechnic Institute, to be given to the student who shall present the best graduating thesis involving an original design of an engineering work or an original investigation of a process which may be of special interest to civil engineers.

A New Electric Motor.

The Barrett Storage Battery Company, of Springfield, Mass., is building an electric motor car for street railroad service to be operated by the company's storage batteries. It is to be about 10 ft. long, and is to be a locomotive, not a passenger car, simply taking the place of the horses. It will be furnished with 300 cells and two 20 H. P. motors, which will give 100 H. P., sufficient for an ordinary day's work. The mechanism is so arranged that the car can be propelled by either the overhead system or storage batteries. The company

claim that it will be noiseless and will draw two cars. This company's batteries have been in use several months on the Beverly & Danvers (Mass.) road, and have given satisfactory service in train-lighting on the Connecticut River road for six months past.

Proposed Ship Railroad Between the Bristol and English Channels.

Sir William Thomas Lewis, the agent of the Marquis of Bute, with Mr. R. Capper, the honorable secretary of the Capital and Labor League, and Mr. W. R. Kinnible, M. I. C. E., as chief engineer, are supporting a project for a ship railroad, 36 miles long, from Bridgewater, on the Bristol Channel, to Seat-n, at the mouth of the Axe, near the boundary between Devon and Dorset counties, on the south coast of England. The proposed ship railroad is intended to save the voyage around Land's End for Welsh coal and other freight destined for London and ports on the English Channel. It is to be a four-tracked road, intended to transport vessels of 1,000 tons register, on the system invented by Mr. Smith, the harbor engineer of Aberdeen, known as the flexible car system. This proposition is in the place of the ship canal proposed some two years since, which was estimated to cost about £6,000,000. The ship railroad, it is estimated, can be built for about £2,000,000, and is expected to afford greater facilities for shipping, and when not in use as a ship railroad it will be available for a double-tracked road for ordinary railroad traffic.

The Hall Signal.

The Michigan Central is to equip 14 miles of its double track road, from West Detroit to Wayne Junction, with the Hall automatic block signals.

Steamship Contract.

The contract for the new steamer for the government service in British Columbia has been awarded to Fleming & Hunter, Glasgow, Scotland. Tenders were requested for the construction of either a steel or wooden vessel, the latter being asked for on the representations of the British Columbia board of trade and the members for that province in order to give local shipbuilders an opportunity of tendering. However, the tender of Fleming & Hunter for a steel vessel was only a little more than half the price quoted for a steamer of wood. The contract price for the vessel is \$75,000 or \$5,000 in excess of the parliamentary appropriation. The Polson Iron Works Company of Toronto tendered for the steel vessel, but their figures were higher than the Clyde firm.

THE SCRAP HEAP.

Notes.

The Indianapolis Frog & Switch Co. announces that it will soon put on the market a new interlocking system.

H. C. Kemp, the rear brakeman of the coal train which caused the disastrous wreck at Shoemakersville, Pa., was arrested on Saturday on a charge of manslaughter.

The New York, Lake Erie & Western is building a new block tower at Ramapo, N. Y., on the Eastern division. The two new interlocking towers at Hawthorne and Waldwick went into operation Sept. 28.

The Pennsylvania Co. has arrested 19 men and boys in the vicinity of Niles, O., for jumping on trains and for stoning them when put off. All the railroads in that vicinity have been much annoyed by trespassers. Hats and umbrellas were stolen from passenger trains.

The block system has just been put in use on the Baltimore & Ohio between Wilmington and Philadelphia, 25 miles, in which distance 14 blocks have been established. The system is also to be put in use between Alexandria Junction and Washington, and between Relay station and Baltimore.

The Chicago Railway Switching Association, the organization for doing the switching at the Union Stock Yards, had only fairly got to work when there was a strike of all the men, on account of two objectionable men on a Chicago, Burlington & Quincy engine sent into the yard. Several conferences were held and a temporary compromise fixed up.

The members of the Switchmen's Mutual Aid Association at their annual meeting in Buffalo last week voted by a large majority in favor of a resolution endorsing link-and-pin couplers. Experience with cars equipped with diverse types has apparently strengthened the feeling of these men against any change in couplers. The newspapers state that the "advocates of the Safford were highly elated." The Association appointed a committee to gather evidence regarding coupling accidents all over the country, to be reported next year.

Some time ago the operators and clerks on the "Mackay" roads formed a federation at Evansville, Ind., with a view of demanding increased pay. B. M. Hopkins, the company's agent, was elected President, and W. D. Sears, of Princeton, Secretary and Treasurer. Last week Wednesday, Sears being discharged, the men struck. The men on the Evansville and Terre Haute and Indianapolis and Indianapolis resumed work, however, the next day on the order of Hopkins. There was some delay of freight trains, but none of passenger trains, during the short strike.

The Southern Pacific, after numerous conferences, has agreed with its trainmen on a new schedule of wages which went into effect Oct. 1. By its terms passenger conductors running between Oakland and Sacramento, Ogden, Red Bluff, Portland, Lathrop and El Paso, now receiving \$110 and \$115 per month, will receive \$125. Brakemen on the same routes now receiving \$70 per month will get \$75, and baggage men now getting \$75 will get \$80. Between Oakland and Sacramento, Red Bluff and Lathrop, conductors' salaries will be raised from \$110 to \$120 per month. Brakemen now getting \$65 will get \$70, and baggage men will be increased from \$70 to \$75. The freight conductors running between Sacramento and Ogden, Dunsmuir and Ashland, Bakersfield and El Paso will have their salaries raised from \$85 to \$100 per month, and their brakemen now receiving \$70 will receive \$80. On all the valley lines conductors are to receive \$90 instead of \$80, and the brakemen \$75 instead of \$65. The advanced wages will make an increase in operating expenses of about \$75,000 per year. Having settled with the conductors, brakemen and baggage men, the officials were at once called upon by a committee representing the engineers.

The Chicago & Northwestern and Illinois Central after amicable conferences with committees, have increased the wages of trainmen. On the former the conductors, who are now paid from \$83.33 to \$116 a month, demanded an increase and classification, making the pay of the various grades \$115, \$125 and \$135. An agreement was finally reached that there should be an advance to a scale ranging from \$90 to a \$120 a month,

Under the new classification there will be four grades, ranging from 4,200 miles to 5,200 miles a month. More will receive \$120 a month than now receive \$116. The conductors on suburban trains are advanced from \$83.33 to \$90 a month, and in addition will be paid for all Sunday work, which will make their pay practically \$100. The increase in expenditures for conductors will be over 13 per cent. This is the first change in the conductors' scale on the Northwestern in over seven years. On the Illinois Central the increase entails an additional expense of \$100,000 a year on the company on 3,000 miles of road. Passenger conductors are to receive \$80 to \$125; brakemen, from \$50 to \$55, and baggagemen from \$55 to \$60 per month. Freight conductors and brakemen are to be paid by mileage, which will materially increase their wages. Superintendent Russell says: "The company has granted the demands of the men in all except a few cases. Concessions were made by both the men and the company."

Coal and Ore Handling Facilities on Lake Erie.

The *Iron Trade Review*, Cleveland, has published a series of articles on this subject, illustrated with plans of the various harbors, from which the following information is condensed. The ore-receiving capacities of the various ports are as below:

| Port. | Length. | Average width. | Total square feet. | Daily capacity (tons). |
|-----------|---------|----------------|--------------------|------------------------|
| Buffalo | 4,000 | 275 | 1,100,000 | 5,000 |
| Erie | 6,400 | 150 | 930,000 | 10,000 |
| Ashabula | 10,460 | 275 | 2,876,500 | 26,070 |
| Fairport | 6,550 | 250 | 1,637,500 | 12,000 |
| Cleveland | 9,200 | 295 | 2,714,000 | 25,460 |
| Lorain | 6,600 | 100 | 600,000 | 3,000 |
| Huron | 275 | 100 | 27,500 | 1,000 |
| Sandusky | 1,314 | 100 | 131,400 | 4,000 |
| Toledo | 1,350 | 75 | 101,250 | 4,500 |
| Total | 45,519 | 180 (av.) | 10,148,150 | 90,970 |

The storage capacity for ores at the various ports is:

| Port. | Length. | Average width. | Capacity (tons). |
|-----------|---------|----------------|------------------|
| Buffalo | 4,000 | 275 | 150,000 |
| Erie | 7,200 | 150 | 300,000 |
| Ashabula | 18,460 | 275 | 2,000,000 |
| Fairport | 6,550 | 250 | 1,000,000 |
| Cleveland | 12,000 | 295 | 1,875,000 |
| Lorain | 9,000 | 150 | 350,000 |
| Huron | 275 | 100 | 30,000 |
| Sandusky | 3,000 | 100 | 215,000 |
| Toledo | 4,350 | 75 | 565,000 |
| Total | 64,835 | 185 (av.) | 6,485,000 |

Buffalo, Fairport and Huron store on docks alone; Erie, Ashtabula, Cleveland, Lorain and Toledo store on docks and trestles, and Sandusky on trestles only.

The coal-handling capacities of the ports are given as follows:

| Port. | Length. | Average width. | Daily capacity (ton). |
|-----------|---------|----------------|-----------------------|
| Buffalo | 8,000 | 150 | 28,000 |
| Erie | 3,600 | 150 | 5,800 |
| Ashabula | 3,2 5 | 230 | 8,400 |
| Fairport | 1,650 | 250 | 2,500 |
| Cleveland | 11,300 | 175 | 12,200 |
| Lorain | 6,000 | 150 | 4,500 |
| Huron | 1,000 | 100 | 1,000 |
| Sandusky | 1,117 | 100 | 3,800 |
| Toledo | 3,000 | 100 | 8,550 |
| Total | 38,272 | 158 (av.) | 75,150 |

Improvements both in additions to docks and in the character and capacity of handling machinery are in progress, which will make a decided gain in next year's returns of capacity.

Ore Shipments and Other Lake Notes.

The return of the *Marquette Mining Journal* of ore shipments up to Sept. 24 by ranges is:

| | Gross tons. |
|-----------|-------------|
| Marquette | 2,048,270 |
| Menominee | 1,579,918 |
| Georgie | 1,983,567 |
| Vermilion | 710,366 |
| Total | 6,217,951 |

This is 900,000 tons more than was shipped last year up to this time, and the Cleveland *Marine Review* is sanguine that 9,000,000 will be shipped this season; but as all the stock piles are understood to be exhausted, this figure will probably include shipments by railroad. The shipments for the last week, however, which was a very stormy one, were 202,175 tons.

A very decided shortage of coal for lake shipment is reported, which is said to be in consequence of a lack of coal cars. Vessels are forced to go up light.

There are continued inquiries for lake built vessels to be delivered at points on the Atlantic coast, but no new business is reported. The necessity for cutting vessels in two to get them through the Canadian canals would require the establishment of a ship yard at Montreal if much business should offer.

The shipping on the lakes is:

| No. | Tonnage. |
|----------|----------|
| American | 2,011 |
| Canadian | 617 |
| Total | 2,688 |

The seagoing tonnage of this country is, for sail and steam, 1,823,882 in 3,272 vessels, or but little more than twice our lake marine. The average tonnage of lake craft is 409.4 tons, as against 557.4 tons for seagoing vessels.

Five thousand tons of iron ore will be shipped from Kingston this season, mostly to Ashtabula.

A Projected Railroad in Manchuria.

Dispatches received at St. Petersburg from China state that the whole length of the railroad through Manchuria has been surveyed, and that English engineers are busy on the line, which is to be built with English money. The work will be begun immediately, and the line, when completed, will not only be the means of opening up a new channel for British commerce, but will enable China to threaten the Russian provinces in Siberia whenever that country may show signs of becoming troublesome.

Plenty of Head Room in Minnesota.

The Minnesota Supreme Court has decided that the upper berths of all sleeping cars running in that state must remain closed when not in use, the court thus sustaining the order of the Railroad Commissioners.

Vice, Immorality and Bribery.

At Tyler, Tex., last week, according to the New York *Herald*, Judge McCord, of the Seventh Judicial District, refused to confirm the report of Receivers Bonner and Eddy, of the International & Great Northern. In their account appeared items for advertising in newspapers,

and rebates to cotton shippers, amounting to \$6,100. These were thrown out and the amounts charged to the receivers, because, in the opinion of the court, "the giving of rebates is vicious and immoral," and because the court thinks the advertising was given as a bribe to prevent hostile legislation by the Texas Assembly.

Foreign Notes.

Heligoland is to be connected with Germany by two additional telegraph cables.

According to Russian account, French and Belgian capitalists are at present considering the construction of a telephone line from Berlin to Warsaw. The probable cost is placed at 3,000,000 roubles.

In different parts of Germany, notably in Prussia, serious complaints are being made of the scarcity of cars on the railroads. Industrial and agricultural interests are said to suffer considerable inconvenience from this cause.

The experiments made on different German railroads to provide the fourth class passenger cars with seats have been abandoned. It has been found that such seats interfere with stowing away the baggage usually carried in large quantities by most of the patrons of these cars. It has, however, been proposed to fit up a certain number of the cars with seats, and to distinguish them from those without seats by conspicuous signs. This arrangement, it is thought, is likely to meet with general approval.

The Independent Order of Railway Conductors.

The executive committee of this new organization has just issued a circular embodying its principles and aims. The circular is so outspoken on the subject of strikes, and the position taken by this order is so wise and shows such a just conception of the relations and duties of citizens of any class of men, that we are glad to be able to publish enough of the circular to give an idea of the purposes of the organization.

We declare the Independent Order of Railway Conductors organized upon the following principles:

- (1) Honesty and fairness in our dealings with all.
- (2) Positive refusing to engage in a strike or giving aid or sympathy.
- (3) Contributing to the relief of worthy conductors, their widows and orphans.
- (4) Defence of brother conductors, their wives and children.
- (5) Abstinence from the sale or traffic of intoxicating liquors.

We believe conductors can have no sympathy with the disorder and lawlessness attending the methods of striking organizations.

We hold it incumbent upon ourselves to perform all duties to our employers honestly, loyally and faithfully, giving the best possible service as the true basis for increased remuneration and advancement.

We also owe a duty to the public which demands sacrifice of personal considerations, and under no possible circumstances can we assume the right to obstruct the business of the country or delay innocent travelers in order to right a personal grievance.

We believe all violent attempts to secure favor or employment are unnecessary; the intelligence and wisdom of the conductor and official of this age are sufficient to amicably and honorably adjust all differences of whatever character or nature in a just and reasonable manner."

Provision for death or total disability is made by an assessment on each number of one dollar for each claim properly authenticated. The President of the order is Mr. E. D. Nash, St. Albans, Vt., from whom any further information may be had.

Lock-out of Switchmen at Denver.

The Union Pacific, on Sept. 23, notified the switchmen in Denver that Richard Burns, the yard-master who had been removed on their demand, would be reinstated, the work having got so badly behind that the situation was intolerable. It seems that the yard-man purposely delayed cars and demanded money from consignees before delivering bulk freight. The General Manager's circular notified all who would not loyally work under Burns to quit, and they all did so. The company secured 100 deputy sheriffs and at once organized a new force, which seems to have got matters straightened out in a few days. The new men did as much work with 7 engines as the old force had done with three times that number. A general strike throughout the Union Pacific lines was threatened, but does not seem to have materialized as yet.

Nine Points of the Law.

A dispatch to the Cleveland *Leader* from Zanesville, O., Sept. 23, says that at two o'clock that morning a wrecking train with officials of the Columbus, Shawnee & Hocking Railroad, seventy men, and United States Marshals Dresbach and Hysel on board, went on the tracks of the Zanesville & Ohio River road at that place, and overpowering the night watchman at the roundhouse and preventing his escape, proceeded to equip two engines, which are disputed property between the companies. At 4 o'clock the engines were in steam and were run on to the track of the Columbus, Shawnee & Hocking. The engines were seized by the Zanesville & Ohio River about a year ago, and since that time have been lying in their roundhouse here dismantled.

LOCOMOTIVE BUILDING.

The Louisville, New Albany & Chicago may soon order five heavy passenger engines of the same type as the modified class "O" engines on the Pennsylvania lines.

CAR BUILDING.

The Delaware, Lackawanna & Western has ordered 100 cars of the Berwick Car Co.

The Delaware & Hudson Canal Co. let contracts this week at Albany for 1,150 cars, which were divided among the following firms: Milton Car Co. and Berwick Car Co., 500 each, and 150 to the Buffalo Car Manufacturing Co. Most of these are coal cars.

The Central Vermont has ordered 500 freight cars of the Erie Car Works.

The Madison Car Co., of Madison, Ill., referred to last week, has filed its charter in Illinois. The capital stock is \$500,000. The object is to build and repair cars. Incorporators are: L. M. Ramsey, Charles F. Orthurin and William Bacon, C. C. Rainwater and Seth Cobb.

The Toledo, Peoria & Western have ordered four new passenger coaches of the Barney & Smith Manufactur-

ing Co., Dayton, O. They will be delivered in a few days.

The Deseronto Car Works have commenced on an order for 50 grain cars for the Canadian Pacific.

The United States Rolling Stock Co., of Decatur, Ala., is working on orders for 200 fruit cars for the Georgia Southern & Florida and 60 platform and ten stock cars for the New Orleans & Northwestern.

The Post-office Department has decided to replace the present 50-ft. postal cars between Washington, D. C., and Richmond, Va., with 60-ft. cars.

The Cincinnati, New Orleans & Texas Pacific has 200 cars under construction at the Elliott Car Works, Gadsden, Ala. The cars are to be equipped with automatic couplers and air brakes. All freight cars on the road undergoing general repairs are to be equipped with automatic couplers and air brakes.

BRIDGE BUILDING.

Aberdeen, Ky.—John Griffith has received the contract at \$2,007 to construct a bridge over Fishing Gut Creek, near Aberdeen.

Bayonne, N. J.—The Central of New Jersey has prepared the specifications for two new bridges to be erected at Avenue D and West Eighth street, and at Linnitt street, several feet higher than the present structures.

Beattyville, Ky.—Brandenburgh & Roberts have the contract for building the bridge across Crystal Creek.

Clifton Forge, Va.—The contract will soon be let for building a bridge over Smith Creek, at the foot of Church street, in Clifton Forge.

Columbus, O.—The Board of Public Works has ordered the City Engineer to prepare plans and specifications for the High street viaduct.

Dayton, Tenn.—It is stated that W. Englewood will receive bids for the construction of two iron bridges.

East Albany, N. Y.—The contract for building the bridge over the Broadway crossing has been awarded to J. Hawkins, of Springfield, Mass.

Eau Claire, Wis.—The Wisconsin Central has commenced the construction of a bridge over the Eau Claire River, giving the road an entrance into the centre of the city where large passenger and freight stations will be erected as soon as the ground can be made ready.

Greenville S. C.—L. K. Clyde will receive bids until Oct. 15 for the construction of a bridge over the Saluda River at Holliday's Ford.

Indianapolis.—The Pennsylvania Company is building a new bridge over Eel River, on the Logansport Division.

Jefferson County, W. Va.—The county courts of Jefferson and Berkley counties, West Virginia, have appointed a joint committee to ask for plans and bids for a new roadway bridge over the Opequan River, which separates the two counties. The committee is composed of Joseph Fiebus, John E. Boyd, R. Foreman, W. O. Norris, Richard Henderson, John T. Colston and J. W. Rider.

Lincoln, Neb.—The local authorities have decided to construct two viaducts in this city.

New London, Md.—The contract for placing an iron bridge 90 ft. long, over Ben's Branch at New London, has been awarded to H. G. Welty, of Frederick, Md., by the County Commissioners.

Pearl, Ill.—The Toledo, Peoria & Western is replacing its old bridge across the Illinois River at Peoria with a new iron and steel structure of approved design. The contract has been let to the Keystone Bridge Co., of Pittsburgh, and the work is to be finished by Nov. 1. During the progress of this work the trains of this road and also those of the Terre Haute & Peoria, which run over its tracks, will be sent around by way of Pekin, 10 miles south.

As soon as this bridge is finished the Peoria & Pekin Union will replace the bridge which recently broke down by a new structure. Then heavy engines can cross either bridge.

Sion City, In.—An ordinance requiring the building of a viaduct over the railroad tracks on lower Fourth street has been passed by the city council. The city engineer has been instructed to make plans and specifications. The proposition of the Chicago, Milwaukee & St. Paul Co. to build a viaduct over its track on Fairmount avenue has also been accepted by the council.

Troy, Ala.—J. B. Ewing has received contract for building a bridge across Little Patsaliga River.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is held that a railroad bridge, not constructed as part of the road, and used for general purposes of travel, is subject to local taxation, and the return of the bridge to the railroad assessors of the state as a part of the road's mileage does not exempt it from such taxation as an independent structure.¹

In Texas the Supreme Court holds that where a railroad, in consideration of a right of way, contracts with the grantor for the erection of a tank on his land for his use, to be supplied with water from his spring, and agrees to pay him therefor, a lien to secure such payment exists on the earnings of the road in the hands of a receiver subsequently appointed, and an action for the breach of such contract will lie, and judgment may be rendered against the receiver, under the statute of 1887, which provides that all causes of action, when determined, existing against a corporation at the time of the appointment of a receiver, shall be paid out of the earnings of the corporation while in his hands, and the same shall be a lien on such earnings.²

The Supreme Court of the United States decides that a provision in a railroad charter that the directors of the corporation shall have power to make all needful rules, regulations, and by-laws touching "the rates of toll and the manner of collecting the same," does not constitute an irrevocable contract with the corporation, exempting it from all future legislative control in the matter of regulating and collecting tolls.³

The Federal Court rules that a railroad company whose charter gives it the right to build its road "from" a certain city is not barred from making the Union depot in such city its terminus by the fact that it began to construct its road from a point in the outskirts of the city, and for some time ran trains from such point, when it appears the company never made any permanent

next improvements at such point, and that from the first it made efforts to extend its line to the Union depot.⁴

In Michigan, the Supreme Court holds that a railroad is not liable to one not the owner of land through which it passes for injuries caused by a defective farm crossing on its right of way, under a statute requiring farm crossings to be put in by railroad companies on the application of the owners of lands through which the road passes, where such crossing was put in under a contract with the owner, and no request was ever made for a crossing under the statute. But, as the farm crossing is on the company's own land, and by its nature and use is a continued invitation to those lawfully having a right to cross from one part of the farm to the other to cross there, it is the company's duty to keep it in safe condition.⁵

In Virginia, it was agreed between a construction company and a railroad company that the former should surrender to the latter certain of its first mortgage bonds to be canceled, in consideration of the former's release from all damages for breach of contract to construct the railroad company's road, and of the issue to it of certain second mortgage and income bonds. Pursuant to the agreement, the first mortgage bonds were surrendered and canceled, and the mortgage securing them was released; but the railroad company failed to deliver the second mortgage and income bonds, and executed sundry mortgages to a mortgagor which had notice of the agreement. The Supreme Court of Appeals holds that the agreement gives the construction company an equitable lien on the property of the railroad company for an amount of money equal to the face value of the bonds agreed to be delivered to it, with interest according to the terms of the agreement.⁶

Carriage of Goods and Injuries to Property.

In Iowa the Supreme Court rules that in an action on a contract between plaintiffs and defendant railroad company to allow plaintiffs rebates on shipments of stock, where the contract was to take effect on the breaking of a pool to maintain schedule rates between defendant and competing lines, plaintiffs are only bound to show that the pool existed, and not its terms, or the parties to it. Evidence that defendant and the competing lines had offered special or cut rates to shippers is sufficient to warrant a finding that the pool had been broken. Evidence that a stock agent of a railroad company had made contracts for special rates, which were recognized and performed by his principal, is sufficient to show his authority to make contracts for rebates, which is in effect making special rates. No special authority to make contracts for rebates need be shown where a pool exists, since the rebate itself implies the existence of a pool, its object being to conceal special rates from competitors.⁷

In Oregon the Supreme Court holds that when property in course of transit is taken from possession of the carrier by virtue of legal process sued out against the owner, the carrier is excused from liability for not delivering the goods.⁸

In North Carolina the railroad to which goods were delivered to be shipped to plaintiff, via connecting lines, gave a bill of lading, stipulating that the rate of freight should be \$45.54. Defendant railroad, which delivered the goods at their destination, refused to allow plaintiff to take possession of them until he paid freight charges amounting to \$146.40, which he did. The Supreme Court holds that, in the absence of any agreement with defendant, plaintiff cannot recover of it the overcharge; his remedy being against the company which made the contract by issuing its bill of lading.⁹

In Maine the Supreme Court rules that where a colt is injured by becoming entangled in a barbed-wire fence which had become dilapidated by the company's negligence, and which was likely to cause injury to a colt, without misconduct on its part, the company is liable, though the fence was legally sufficient to prevent the escape of animals.¹⁰

In Texas, the Supreme Court decides that under the Constitution, providing that property shall not be taken or damaged for public use without just compensation, a railroad company cannot convey to another company part of the interest in land which it has acquired by purchase of a right of way, so as to enable the latter company to build and operate an additional road over such right of way, without the consent of the owner of the fee, unless by condemnation proceedings. Where such sale is made, the owner of the fee may enjoin the second company from building its road until compensation has been made to him.¹¹

In Indiana, the Supreme Court rules that where proceedings are resorted to by a railroad company to appropriate a right of way along a public street, and for assessment of damages sustained by owners of abutting property, the damages so assessed are conclusively presumed to include all damages which may in the future result to the property owner from the legitimate and necessary use of the street for the operation of the road. Such use includes the laying of necessary additional tracks or switches.¹²

Injuries to Passengers, Employees and Strangers.

In South Carolina, a train which plaintiffs expected to take on defendant's road did not stop at the station, and they were obliged to wait over until the next train, and they alleged injuries through being chilled with cold, and exhausted from fatigue and mental distress. The Supreme Court rules that, there being no evidence of any pecuniary loss to plaintiffs, a nonsuit was properly granted.¹³

In New York, the conductor of an elevated train signaled it to start at the same instant that he opened the gate for a passenger to alight, and the motion of the train in starting caused the door to swing onto the passenger's hand, injuring it. The Court of Appeals rules that the company was chargeable with negligence.¹⁴

In Michigan, the assistant roadmaster, under whose supervision plaintiff was working, had general charge of about 150 miles of defendant's road, and controlled all the section gangs along that line. He had full oversight of the work in which plaintiff was engaged at the time of the injury, and it appeared that plaintiff looked on him as the responsible head, from whom he (plaintiff) received his orders, and who had power to discharge him. The Supreme Court holds that he was not a fellow-servant of plaintiff, but represented defendant, who was liable for his negligence while in the line of his duty.¹⁵

In Pennsylvania, a railroad running cars upon a private side track sometimes separated them so as to enable the owners of the track to use a path across it, but, when it did not, plaintiff, an employee of the owners of the track, made the separation; and, in so doing, on one occasion he was injured by the bumping of an engine against the cars. The Supreme Court holds that the plaintiff was within the statute of 1898 providing

that when any person is injured while lawfully on or about the premises, cars, etc., of a railroad company, of which he is not an employe, the company's liability shall be only such as would exist if the person injured were its employe.¹⁶

In Texas, the plaintiff's husband was run over by some cars which were detached from the engine, and were being switched to a side track. On one side of the side track was a sawmill, and on the other side, about 8 ft. from the track, was a file room, in which deceased worked. His business required him to cross the track frequently, going from the file room to the mill. A brakeman on the cars, which were running faster than usual, after looking ahead, and seeing no one on the track, turned his back. The engine's whistle had been blown on the arrival of the train, but it was not blown during the time the switch was being made, and the noise from the mill would drown that of the cars. The view of the switch track was somewhat obscured from the door of the file room, but not so to a person advanced a few feet from the door toward the side track. Deceased came out of the file room and could have seen the cars if he had looked up the track, but he was looking toward the mill, and just as he stepped on the track he was run over. The Supreme Court holds that the deceased was negligent and the plaintiff cannot recover damages.¹⁷

In Georgia, the plaintiff's declaration alleged that, in making a coupling between a standing car and a switch engine, it became necessary for plaintiff to step between the rails; that, on attempting to follow the backward motion of the cars, his left foot was caught either by the cross-ties or the iron rail of the track, and ran over; that the cross-ties were placed too close together, and the spaces between them were not filled in; that the iron rails were old and worn, and had sharp prongs protruding from the inner edges, and that plaintiff was ignorant of these defects when he started to make the coupling. The Supreme Court rules that the declaration set forth a cause of action, it not affirmatively appearing from its face that plaintiff could have known of the defects in the track by the use of ordinary diligence.¹⁸

¹ St. Joseph & G. I. R. Co. v. Devereux, 41 Fed. Rep. 41.

² Howe v. Harding, 13 S. W. Rep. 41.

³ C. M. & St. P. R. Co. v. State, 1931, C. Rep. 462.

⁴ Colorado E. Ry. Co. v. Union Pac. Ry. Co., 41 Fed. Rep. 293.

⁵ Stewart v. Cincinnati, W. & M. Ry. Co., 44 N. W. Rep. 1116.

⁶ Fidelity Insurance, Trust & Safe Deposit Co. v. Shenandoah, Va. R. Co., 11 S. E. Rep. 58.

⁷ Marsh v. C. I. & P. R. Co., 41 N. W. Rep. 502.

⁸ Jewett v. Olsen, 23 Pac. Rep. 262.

⁹ Mount Pleasant Manufacturing Co. v. Cape Fear & Y. V. R. Co., 10 S. E. Rep. 1046.

¹⁰ Gould v. B. & P. R. Co., 10 Atl. Rep. 84.

¹¹ Ft. W. & R. R. Co. v. Jennings, 13 S. W. Rep. 276.

¹² White v. Chicago, St. L. & P. R. Co., 23 N. E. Rep. 782.

¹³ Martin v. Columbia & G. R. Co., 10 S. E. Rep. 990.

¹⁴ Baker v. Manhattan Ry. Co., 23 N. E. Rep. 886.

¹⁵ Harrison v. Detroit, L. & N. H. Co., 44 N. W. Rep. 1034.

¹⁶ Stone v. Pennsylvania R. Co., 10 Atl. Rep. 67.

¹⁷ S. & E. T. R. Co. v. Dean, 13 S. W. Rep. 45.

¹⁸ Preston v. Central Railroad & Banking Co., 11 S. E. Rep. 143.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Railroad Superintendents will hold its annual meeting in New York City, Oct. 7.

The General Time Convention will hold its next semi-annual meeting at the Hotel Brunswick in New York City, Oct. 8.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:30 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the Southwest holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Denver Society Civil Engineers and Architects.

The annual convention will be held at Manitou, Oct. 10 and 11.

The expectation is to meet Friday evening in convention, to go up on Pike's Peak by the Rack Railroad Saturday morning, and to have a supper Saturday evening. Papers on the Manitou & Pike's Peak Railroad will be read.

New England Railroad Club.

The regular meeting of the Club will be held at the United States Hotel, Boston, Wednesday, Oct. 8, 1890, at 7:30 p. m. The subject for discussion is: Steel Tire Wheels: Methods for Equalizing their Wear and Machines for Turning Them Off.

Northwest Railroad Club.

At the meeting of the Club at St. Paul, at 7:30 p. m. Saturday, Oct. 4, the subjects for discussion will be: (1) "Firebox and Boiler Construction" (continued from last meeting), with paper by Mr. W. H. Lewis, of the C. B. & N. (2) "Brake Beams: The best form and method of hanging them," to be introduced by Mr. H. L. Preston, of the C. St. P. M. & O., and Mr. E. A. Westcott, of the C. M. & St. P.

The Southern and Southwestern Club.

At a meeting of the members of the club at the Southern Hotel, in St. Louis, last week, the organization was completed. It was decided to hold the next meeting at Nashville, Tenn., on the third Thursday of November. The officers of the club are: E. S. Marshall, President, General Master Mechanic of the St. Louis, Arkansas & Texas; J. J. Casey, Vice-President, Superintendent of Motive Power and Machinery of the Louisville, New Orleans & Texas Road; W. Garstang, Vice-President, Superintendent of Motive Power of the Chesapeake & Ohio; W. H. Marshall, Secretary.

PERSONAL.

Mr. Charles H. Cromwell, at present Traffic Manager of the Western of Alabama, has been chosen Traffic Manager of the Atlantic & Danville.

Mr. William Smith has been appointed Superintendent of Motive Power of the Chicago & Northwestern to fill a vacancy caused by the death of Mr. George W. Tilton.

A circular has been issued by the Louisville, New Orleans & Texas and the Newport News & Mississippi Valley Co., announcing the appointment of E. W. How as General Traffic Manager for both roads.

Mr. James Holme, of the Canadian Pacific engineering staff, died last week at his home at Winnipeg of typhoid fever. He had been connected with the Canadian Pacific for some years, and was 34 years of age.

—Mr. John Bogart, Secretary of the American Society of Civil Engineers, reached home by the "Servis" Monday of this week. A large number of the visitors from the British Iron and Steel Institute and the Verein Deutscher Eisenhüttenleute came by the same steamer.

—Mr. J. J. Shea, formerly General Store Keeper of the New York, Lake Erie & Western, has been appointed General Supply and Material Agent of the New York Central & Hudson River road, with office at East Albany, N. Y. Mr. Shea had charge of the supplies on the West Shore road during its construction.

—Mr. James F. Goddard, ex-Chairman of the Western Passenger Association, has been nominated to succeed Mr. Albert Fink as Commissioner of the Trunk Line Association, with authority over both the freight and passenger departments. Mr. Goddard was born in Brockton, Mass., Jan. 28, 1842. He entered the railroad service as a clerk in the general freight office of the Chicago, Burlington & Quincy in 1868. From Jan. 1, 1872, to November, 1874, he was Assistant General Freight Agent of that road. From 1874 to September, 1875, he was General Freight Agent of the Hannibal & St. Joseph road; but then he resumed his old position on the Burlington, leaving it in July, 1878, to become General Freight Agent of the Atchison, Topeka & Santa Fe. He remained in the service of the Atchison nearly 12 years, rising by successive promotions through the posts of Traffic Manager, Assistant General Manager and Manager to the place of Third Vice-President. He resigned the last-named position in the early part of the present year to become Commissioner of the Western Passenger Association. This office he resigned a few weeks ago, and he has since declined the Commissionership of the Southwestern Railway & Steamship Association.

—Mr. Frederick Billings, ex-President of the Northern Pacific, died at his home at Woodstock, Vt., Sept. 29. Mr. Billings was stricken with partial paralysis of his left side in New York last Christmas Eve and in May was removed to Woodstock. He became slowly worse since that time. Mr. Billings was born at Royalton, Vt., in 1823. He had made preparations to start for California in 1848 before the discovery of gold and when he arrived in San Francisco, formed a law partnership. He was very successful and took a prominent part in the events of those days. He returned East in 1866. In 1870 he was elected a director of the Northern Pacific; at the time of the panic of 1873, when the railroad's fiscal agents, Jay Cooke & Co., failed, Mr. Billings was managing director of the land department which he had organized, and he rendered valuable aid in the reorganization of the road. He was then appointed Chairman of the Executive Committee, and in 1875 was elected President. The construction of connections to the Pacific was resumed, and prominent banking firms formed a syndicate to negotiate the placing of \$40,000,000 of bonds. Mr. Billings resigned in 1881. He was at the time of his death a director in the Farmers' Loan & Trust Co., the Delaware & Hudson Canal Co., the Manhattan Life Insurance Co. and the Rutland, Vermont Valley, Connecticut River & Passumpsic Railroads, and other large financial concerns. He was also chairman of the Executive Committee of the Maritime Canal Co. of Nicaragua. Mr. Billings was a trustee of many charitable associations and his gifts had aggregated to those institutions many hundred thousands of dollars.

ELECTIONS AND APPOINTMENTS.

Arkansas Southern.—The directors of this Arkansas company are: Paul F. Beardsley, S. B. Lide, J. A. Proctor, of Camden, Ark.; J. W. Young and E. C. Young.

Atlanta & West Point.—R. E. Lutz, for some time past General Agent of the road, has been appointed General Traffic Manager, to succeed Chas. H. Cromwell, resigned.

Chicago & Erie.—O. F. Gross has been appointed Train Master of the Eastern Division. George A. Coe has been appointed Train Master of the Western Division.

Chicago, Iowa & Pacific.—The incorporators are: E. R. Hutchins and W. H. Ward, of Des Moines, Ia.; Jesse A. Baldwin, Henry R. Baldwin, George H. Simmons and Charles A. Newton, of Chicago, and Christian Lynch, of Harrisburg, Pa.

Chicago, Milwaukee & St. Paul.—The following changes in the executive force of the road have been made: E. W. McKeenna, appointed Assistant General Superintendent of the Middle District, embracing the Praire du Chien, Mineral Point, La Crosse, Wisconsin Valley and Northern Divisions, and the Milwaukee & Northern Railroad, with office at Milwaukee; D. C. Cheney, appointed Superintendent of the La Crosse Division; Superintendent R. R. Minturn, transferred to the Wisconsin Valley Division, with office at Tomay, Wis.; Jas. R. Williams, appointed Superintendent of the Iowa & Minnesota Division.

The Milwaukee & Michigan Division will be the name given by the Chicago, Milwaukee & St. Paul to its new property, the Milwaukee & Northern.

Chicago & West Michigan.—Job Tuthill has been appointed Engineer in charge of plans, estimates, specifications and inspections of all bridges and buildings upon this road, and J. F. Beimling has been appointed Engineer in charge of surveys, maps, plans and drawings, both with office at Grand Rapids, Mich.

Cleveland, Cincinnati, Chicago & St. Louis.—Hamilton McK. Twombly has been elected a Director of the road.

Cornwallis Valley.—S. Sheffield is President of this Nova Scotia road; D. M. Dickie is Secretary and Treasurer and R. W. Butler is Chief Engineer. The principal office is at Canning, N. S.

Fairhaven & Southern.—At the annual meeting at Fairhaven, Wash., Sept. 25, the following officers were elected: President, C. X. Larabee; Treasurer and General Manager, E. M. Wilson; Secretary, E. L. Cowgill.

Fitchburg.—At the annual meeting of the stockholders in Boston last week the following directors were elected: Henry S. Marcy, Robert Codman, Rodney Wallace, Charles T. Crocker, Frederick L. Ames, George Heywood, Augustus Kountze, William P. Webb and William H. Hollister. John Quincy Adams, David P. Kimball, and James Renfrew, Jr., are State Directors, and their names do not appear on the stockholders' ticket for that reason.

Gainesville, Henrietta & Western.—At the annual meeting of the directors held at Gainesville, Tex., Sept. 27, the following officers were elected: F. M. Dougherty, President; R. D. Gribble, Vice-President; J. M. Lindsay, Secretary and Treasurer, all of Gainesville. The directors elected are: H. E. Eldridge, Gainesville; R. C. Foster,

Denison; E. Ellery Anderson, Simon Sterne, Samuel Oppenheim, New York.

Georgia, Tennessee & Illinois.—The following are given as incorporators in the Alabama charter: J. H. Plummer, J. M. McBride and J. C. Kibble, of Tallapoosa, Ga.; A. J. McBride and J. A. Burns, of Atlanta, Ga.; and W. B. Thomas, of Tennille, Ga.

Lake Shore & Michigan Southern.—The company has announced the following appointments: T. J. Charlesworth appointed General Agent of this company, with headquarters at Cleveland, O.; T. F. Whittelsey appointed Superintendent of the Michigan Division, vice T. J. Charlesworth; R. C. Harris appointed Superintendent of the Lansing Division, vice T. F. Whittelsey; A. H. Smith appointed Superintendent of the Kalamazoo Division, vice R. C. Harris; Mr. Smith has been foreman of bridges, with headquarters at Adrian, Mich.

Louisville & Nashville.—Daniel Vreck has been appointed Roadmaster of the Short Line division to fill the vacancy caused by the death of Clifton Rowland, who was killed in the accident at Spring Hill Station about six weeks ago.

L. S. Robertson, formerly Assistant Superintendent of the Louisville Division, has been appointed Superintendent of the Cumberland Valley Division, with headquarters at Middlesborough, Ky.

Louisville, St. Louis & Texas.—At the annual meeting of the stockholders of the road held at Louisville, Ky., Sept. 25, the following officers were re-elected: W. V. McCracken, President; George A. Evans, Vice-President, and J. K. McCracken, General Manager.

Missouri, Kansas & Texas.—Frederic P. Olcott, Louis Fitzgerald and Charles F. Beach, Jr., have been chosen as the New York directors of the Taylor, Bastrop & Houston, the Trinity & Sabine, the Dallas & Wichita, the Dallas & Waco, the Dallas & Greenville and the Gainesville, Henrietta & Western companies. These are all the leased lines of the Missouri, Kansas & Texas in Texas.

New York Central & Hudson River.—Clinton L. Rossiter, brother of Treasurer E. V. W. Rossiter, has been appointed Assistant Superintendent of the Harlem Division with headquarters at White Plains, N. Y. At present he is clerk to the Executive Board of the company.

New York & Greenwood Lake.—H. S. Burgess has been appointed Division Passenger Agent of this road and of the Watchung road, with headquarters at 21 Cortlandt street, New York City.

New York, Lake Erie & Western.—George De Haven, Assistant General Passenger Agent, having resigned, reports and correspondence heretofore addressed to him should, until further notice, be forwarded to the General Passenger Agent. George E. Allen having been assigned to duties in the general office, the position of General Northern Passenger Agent has been abolished. A. W. Bodle has been appointed Division Passenger Agent, with headquarters at 177 Main street, Buffalo, N. Y. His jurisdiction will cover the Buffalo, Buffalo & Southwestern, Western and Bradford divisions, and Canadian territory. H. T. Jaeger has been appointed Division Passenger Agent, with headquarters at 21 Exchange street, Rochester, N. Y. His jurisdiction will cover the Rochester division and Dansville & Attica branches.

George S. Hodges has been appointed Special Agent of this company, with headquarters at Pittsburgh, Pa., vice George A. Coe, transferred. He will have charge of such duties as may be assigned him by the Superintendent of Transportation.

W. G. Mason has been appointed Division Passenger Agent at Warren, O., to succeed W. W. Dunnivant, resigned. The appointment took effect Oct. 1.

Old Colony.—The following directors were elected at the annual meeting held this week: Charles F. Choate, of Southborough; F. L. Ames, Easton; Thomas J. Borden and John F. Brayton, Fall River; Silas Cobb, Boston; Thomas Dunn, Newport; George A. Gordon, Boston; Charles J. Lovering, Taunton; William J. Rotch, New Bedford; John J. Russell, Plymouth; Nathaniel Thayer, Lancaster; and R. W. Turner, Randolph.

Peru & Detroit.—The following are the officers of this Indiana company: C. H. Brownell, President; Louis B. Fullwiler, Secretary; R. F. Donaldson, Vice-President, and R. A. Edwards, Treasurer. The office is at Peru, Ind. The road is to be operated by the Wabash.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The Third Vice-President and Comptroller announce that the following officers of this company, having been duly appointed by the Board of Directors, will perform the respective duties devolved upon them by the organization. Their offices will be at Pittsburgh, Pa.: Jno. W. Benner, Assistant Comptroller; A. McElevy, Auditor of Freight Receipts; Jno. M. Lyon, Assistant Auditor of Freight Receipts; J. P. Farley, Auditor of Passenger Receipts; Chas. S. Covert, Assistant Auditor of Passenger Receipts; James Instan, Auditor of Disbursements, and D. C. Copperstone, Assistant Auditor of Disbursements.

St. Louis & San Francisco.—J. M. Egan has been appointed Superintendent of Telegraph of all lines operated by the company, with headquarters at Springfield, Mo., vice L. Headley, resigned.

Seattle, Lake Shore & Eastern.—Under an agreement entered into with the Northern Pacific the Spokane division of this road is now operated by the Northern Pacific, and the authority of W. S. Mellen as General Manager has been extended over the Spokane Division of this road.

Toledo, Ann Arbor & North Michigan.—Commencing Oct. 1, all remittances must be sent to the First National Bank at Toledo, O., instead of to the Treasurer and Auditor as heretofore. Telegraph receipts and special remittances must be sent in separate envelopes from the regular station remittances.

Wellsville, Uudersport & Port Allegany.—W. W. Atwood, Superintendent and General Passenger and Freight Agent of the Bradford, Eldred & Cuba, has been appointed General Superintendent of this company.

Western of Alabama.—R. E. Lutz, recently General Agent, has been appointed General Traffic Manager, to succeed Charles H. Cromwell, who resigned to accept service with the Atlantic & Danville.

York & Black Mount.—The following are the incorporators of this company referred to last week: W. F. Bay Stewart, York, Pa., President; W. H. Lanier, Frank Geise, Daniel H. Trimmer, Kurwin L. Eisenhart and Jesse V. Giesy, all of York, Pa., Directors.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Alabama, Georgia & Florida.—Maj. W. S. Greene, Chief Engineer of the road, has completed the preliminary survey for the line from Quincy, Fla., to Bessemer, Ala. One surveying corps started from Quincy going north, and the other from Bessemer going south. The two parties met near Rockford, Coosa County, Ala., having surveyed 301 miles in the states of Florida, Alabama and Georgia. The route surveyed is a fair one from Quincy to Rockford. From that place to Bessemer, a distance of 77 miles, the preliminary survey runs through an exceedingly rough country. The second survey will probably find a much better route from Rockford to Bessemer than the line first run. The final survey will also shorten the distance between Quincy and Bessemer from 15 to 20 miles.

Arkansas Southern.—Articles of incorporation of the company have been filed at Little Rock, Ark. The road is to extend from El Dorado, Union County, south to the Louisiana state line, a distance of about 18 miles.

Arlington, Alexandria & Mt. Vernon.—It is claimed that this company is prepared to build the road from Washington through Arlington to Mt. Vernon, if it is granted an entrance to Washington and ground for its tracks and station. The company has applied for this permission.

Baltimore & Ohio.—The directors and stockholders of the Baltimore and Ohio & Chicago ratified the lease of the Akron & Chicago Junction road, now under construction, at a meeting held in Columbus, O., Sept. 26. The Baltimore and Ohio & Chicago guarantees the interest on \$1,500,000 bonds issued to build the new road. The Akron & Chicago Junction is to be completed early in 1891, and will be the connecting link in the route from Pittsburgh to Chicago.

Central of Georgia.—The Van Kirk Land and Construction Co., of Montgomery, Ala., which is building the extension of the Mobile & Girard division from Troy to Andalusia and Brewton, Ala., has about 400 men on the work under Worthington, Elliot & De Bardeleben, the contractors. When the grading is finished and cross-ties laid the track will be put down by the railroad company and the line will then be opened for traffic. The contract for a further extension from Andalusia will probably be awarded in a few weeks. J. P. Knabe, of Montgomery, is Secretary of the land company.

Chambersburg & Gettysburg.—A charter was granted at Harrisburg, Pa., this week to the above company to build a road 10½ miles long from a point on the Mount Alto Railroad to the Wolf Hill ore mines in Adams County. The capital stock is \$200,000.

Chattanooga Southern.—Carter & Rogan, contractors for the tunneling at Dug Gap funnel, in Georgia, 25 miles from Chattanooga, want to engage 300 additional men to push the work through as rapidly as possible.

Chicago, Iowa & Pacific.—This company is reported as filing a charter in Iowa this week to acquire the Fort Madison & Des Moines, now operated by the Chicago, Fort Madison & Des Moines, and to extend it. The capital stock is written in nine figures.

Chicago, Milwaukee & St. Paul.—Kimball & McNamara have been awarded the contract to build an extension from Lynn, Wis., north towards Lake Superior. Also to build a road between Nortonville and Aberdeen, S. D., and to change the course of the company's line at Dexterville Junction, Wis.

Cleveland Belt.—Paige, Carey & Co., of 45 Broadway, have been awarded the contract for building this road. The surveys have been completed and the right of way, with a few exceptional tracks, has been purchased. The contractors have just commenced work. The grading is not extremely difficult. Maximum grade per mile is 60 ft., and the maximum curvature six degrees. There are two through span bridges, one 170 ft. between end pins and the other 200 ft. There are also two deck plate girders 80 and 70 ft. in length, respectively, and one trestle 40 ft. high and 1,100 ft. long. The length of the road is seven miles.

Columbus, Hocking Valley & Toledo.—The company is now constructing a track in East Toledo, O., which will connect the main line of that road with the Lake Shore & Michigan Southern. The company has not owned an independent entrance into Toledo, but uses the tracks of the Pennsylvania Company from Walbridge and the terminal facilities of the same company. It is thought that when this connecting track is built the trains will run to and from the Lake Shore Union depot.

Cornwallis Valley.—The company has begun to haul freight over the road between Kentville, on Kingsport and Kentville, N. S., on the Windsor & Annapolis. Passenger traffic will not be commenced for some time, as the ballasting has not yet been completed. This work is now in progress and the road may be ready for operation by the time the passenger cars are delivered. The road commences at Kingsport, where the track is laid on the government pier some 700 ft. long, with from 16 to 26 ft. of water at high water, thence west to Canning, 3½ miles; to Canard, 5½; to Sheffield Mills, 7; to Centreville, 9; to Steam Mills Village, 12, and to Kentville, 15 miles. The station buildings have been built at five of these places. There is one steel bridge, with an 80-ft. span, and three wooden trestle bridges. The maximum grade is 60 ft. per mile and the curves do not exceed six degrees. The company is composed of 10 individuals, who each own an equal interest in the property. All the money to build the line was contributed by these stockholders. The company will receive a government subsidy of \$6,400 per mile when the road is finished.

Denver & Rio Grande.—The company has just completed a branch track from Aspen, Colo., to Cowenhaven tunnel. This tunnel is situated one and one-half miles from Aspen and the new road has been built for the accommodation of the mine.

Georgia Pacific.—The new Coalburg branch from North Birmingham, Ala., has been completed with the exception of half a mile of surfacing. The branch is eight or nine miles in length, is stone ballasted, and reaches an excellent mineral traffic. It was put in operation on Oct. 1, and will be used practically as a second track.

Georgia, Tennessee & Illinois.—The charter for the Alabama division of this company, which was recently filed, provides for a line from near Tallapoosa, Ga., on the line of the state of Georgia, in the county of Cleburne or Cherokee in Alabama, and through the

counties of Cleburne, Calhoun, Etowah, De Kalb, and Jackson, to Stevenson in Jackson County, on the Tennessee River, and a few miles west of Chattanooga, which is to be the northern terminus of the road.

Grand Trunk.—The officials of this road state that it has been decided to build the line between Watford and Glencoe, which is made necessary by the construction of the St. Clair Tunnel.

Huntington & Big Sandy.—The contract for grading the first six miles of the road will be let this week at Huntington, W. Va. The road is to be built from the terminus of the Ohio River road at Huntington to the Norfolk & Western at Kerrova, where the latter company is building a bridge over the Ohio River.

Illinois Central.—The company has awarded the contract for the widening of the bank from Mound Junction south to the approach of the Mississippi River bridge at Cairo, and the filling up of the great trestle over Cottonwood slough. It will require 300,000 ft. of earth to complete the contract, and already over 100 teams are engaged in the work of hauling. Three acres of ground have been purchased by the company from which to get the necessary earth. The contract also provides for the construction of the second track from Cairo to Mound Junction, a distance of nine miles.

Leavenworth & St. Joseph.—About 500 men are working on this road at present. The grading has been finished for most of the 23 miles, and the tracklaying is expected to commence Oct. 5. It is proposed to lay about $\frac{1}{2}$ miles a day. The bridging is already about one-fourth completed, and is being pushed to completion as rapidly as possible.

Lehigh Valley.—The West End Branch of the road, which has just been constructed along the northern limits of Allentown, Pa., and will be temporarily opened this week, is intended as a connecting link with the Pennsylvania, which may be extended to Allentown next year. The road has already been surveyed from Hamburg, Berks County, to Allentown, a distance of 28 miles. A freight house will be constructed in the western part of the city, and the new Lehigh Valley passenger station will be used for Pennsylvania Railroad traffic.

Lynchburg Belt.—C. R. Moorman & Co., of Lynchburg, Va., have been awarded the contract for the extension of this belt road at Lynchburg, which is being built in the interest of the Lynchburg & Durham.

Maine Central.—Tracklaying is in progress on the extension of the Coos division, formerly the Upper Coos road, from North Stratford, N. H., southerly to Quebec Junction, where it will connect with the Maine Central. The track has been laid for about two miles. The grading has been finished on over three-fourths of the line. About 900 men and a corresponding number of teams are at work on the construction. The maximum grade is 66 ft. per mile and the maximum curvature is six degrees. The three most important bridges are: at the upper crossing of the Connecticut River, iron, two spans, 125 ft. each; lower crossing of the Connecticut River, iron, two spans, 150 ft. each, and at the Israel River, iron, one span, 115 ft. The contractors are McDermid, Sinclair & Doheny, of Lancaster, N. H. The extension is from North Stratford through New Hampshire, Brunswick, Vt.; Maidstone, Vt.; Guildhall, Vt.; Lancaster, N. H.; Jefferson, N. H., to Quebec Junction (town of Carroll), N. H.

Mexican Pacific.—The government having approved the section of the road from La Puerta to Tonala, 12½ miles, it has been opened for traffic. La Puerta is the town at the Port, where the company has a 1,200-ft. pier. The construction of the pier at San Benito, and the branch line from that port to Tapachula, 37 miles, on the Mexican side of the Guatemalan frontier, is to be pushed at once. A ship left Liverpool in July loaded with 2,000 tons of material for the railroad. The material for the pier has already arrived from San Francisco.

Mexican Southern.—Tracklaying on this road has reached Tepeaca, Mex., which is 25 miles from Puebla. The tracklaying has been delayed by the non-completion of bridges by masonry contractors and others. On this 25 miles the road passes through the towns of Chichapas, Amozoc and Santa Rosa, at which places stations are built.

Middlesborough Belt.—Thirteen miles of the main line of this road, along the Yellow Creek Valley at Middlesborough, has been completed, and this section of the road is being operated. About seven miles additional will be built this season to reach collieries and coke ovens. Many manufacturing establishments have been built along the line of the road since its completion.

Montana & Wyoming.—The company filed articles of incorporation in Montana this week. The road is to extend from Helena to the mining region about Castle and thence to a point in the southeastern part of Montana. The capital is \$6,000,000.

Nashville, Chattanooga & St. Louis.—It is reported that the contracts for the further extension of the Tennessee and Coosa division from the end of the present 25-mile contract, from Guntersville to Huntsville, has been let to Allison, Shaffer & Co., of Chattanooga. The statement has not been confirmed.

New Roads.—Application is to be made to the General Assembly of South Carolina at its next session for a charter for a road to extend from Lockhart Shoals to Union or some point on the Spartanburg & Union road.

The Liberty Iron Co., of which H. H. Yard, of Philadelphia, Pa., is President, is building a narrow gauge road about 11 miles long from Edinburg to Columbia and Liberty furnaces.

Dr. N. I. Mays, J. G. Carter and others, of Chattanooga, Tenn., have secured a charter for a road from Murphy to Dayton, Tenn., and surveying is reported as commenced.

Macon County, N. C., will soon hold an election to consider the issuing of \$100,000 of bonds for a proposed railroad from Franklin to Tallulah Falls, Ga.

George Hoppe, of Atlanta, is said to be organizing a company to build a railroad from Bremen to Bowdon, Ga.

The building of a road from Broadway to the West Virginia line, and from Broadway via New Market and Luray to Aquia Creek, is being agitated by E. D. Root and others.

No. 10 & Western.—On the Clinch Valley Division of the road trains have been running to St. Paul, Va.,

over 80 miles west of Bluefield, W. Va., on the New River Division, for nearly two months. Tracklaying is in progress between St. Paul and Norton, Va., where connection is to be made with the extension of the Pineville branch of the Louisville & Nashville road. Norton is 103 miles from Bluefield. The Big Creek branch from Richland, on the Clinch Valley Division, north four miles to extensive coal fields, has been completed and work has commenced on a branch up Coal Creek to open extensive gas coal deposits near Doran.

Northern Pacific.—The contracting firm of Griggs & Huestis has 2,000 men in its employ on the Northern Pacific extensions in Washington, the Tacoma, Olympia & Gray's Harbor and the Yakima & Pacific Coast. By Oct. 15 it is expected that the first train will be run from Centralia to Montesano. The road has already been graded three miles beyond Black River Junction in the direction of Montesano, and also for about half the distance between the junction and Olympia. Between Tacoma and Olympia the road is about two-thirds graded.

Webster, Kelso & Co., the sub-contractors on the Chehalis & South Bend extension, have between 800 and 1,000 men at work along the line of the road. There are 600 white laborers at work on the Chehalis and about 250 Chinamen on the South Bend terminus. The force is being increased, and several hundred men are on the way from San Francisco to South Bend to join the graders at that end.

On the extension from Durham, Wash., north a few miles of track has been laid, and the grade has been finished for about 12 miles. The extension will be 18 miles long. A 90-ft. span bridge is to be erected across the Cedar River, and during its construction a temporary trestle will be used for crossing the river to carry rails and supplies for the tracklaying. Bridges will also be built over Raging River and Williams' Creek.

Owing to the delay in securing the right of way for its Lewiston branch across the Nez Perces Indian Reservation in Idaho, part of which has to be crossed to reach Lewiston, the line cannot be completed to that point this year. The track has been laid from Pullman, Wash., westerly across the state line to Moscow, and it is expected to have the branch in operation between Pullman and Kendrick this fall.

Philadelphia, Harrisburg & Pittsburgh.—The company will hold a meeting of stockholders on Oct. 14, to vote on the question of issuing \$2,000,000 of five per cent. bonds. The company has been formed by the merger of the Harrisburg Terminal and the Harrisburg & Potowmac roads, which were owned by the Philadelphia & Reading, which guarantees the bonds. The money is to be used in paying for the construction work now under way. It is expected that trains will be running to a connection with the Reading by spring, and soon afterward the line to connect with the Baltimore & Ohio will be completed, making a new line across the state.

Pittsburgh, Akron & Chicago.—President William Semple is quoted, in a Pittsburgh dispatch, as authority for the following remarks: "I was told when in New York that if I could build a line from Newcastle, Pa., or a point near there, to Chicago, that the line from Jersey City to Lancaster would be ready to operate in from three to five years. We now practically have a line from Akron to Chicago. Our company has all the money required to build from Akron, O., east to or near Newcastle, and also to a point east of Delphos, O., where we will connect with a road already built to Cleveland. Our line from Akron to Fort Wayne, 170 miles, is completed all but laying the rails on 37 miles of grade at the eastern end of the line. It will be completed to Akron by Dec. 1. We are now operating 135 miles of the road—from Delphos to Medina. When the road is completed we will run through trains to St. Louis over the Clover Leaf from Delphos, and to Chicago from Fort Wayne over the New York, Chicago & St. Louis. There are traffic agreements to this effect."

Rio Grande Western.—The company has completed 20 miles of track on the branch from Thistle south toward Fairview, Utah, and it is expected to reach this latter point, which will be the terminus of the first division, by Oct. 15. The line will be continued down through Manti and the Sevier Valley. The company has not yet decided upon the eastern terminal point of its Tintic extension, but it will probably be built from Lehi via the north side of Utah Lake from Spanish Fork.

Rumford Falls & Buckfield.—At a meeting of the stockholders last week a resolution was adopted consenting to the organization of a railroad corporation under the general laws of Maine with authority to extend the road from Canton to Rumford Falls, and through the towns of Andover, Roxbury or Byron. The directors were authorized to lease the road at such rate as will net the stockholders not less than 65 cents for each share of stock per annum.

San Angelo, Abilene, Henrietta & Red River.—At a meeting of delegates from San Angelo, Abilene and Henrietta, held in Fort Worth, Tex., to arrange for the organization of a company to build a road from San Angelo to Abilene, on the Texas & Pacific, and thence to Henrietta, about 175 miles, it was decided to organize under this name, the details to be decided at an adjourned meeting at Abilene, Oct. 20. The road will extend through the counties of Coke, Runnels, Taylor, Jones, Haskell, Throckmorton, Shackelford, Young, Archer and Clay. About \$50,000 has been subscribed in aid of the project. M. Robertson, of San Angelo; W. H. Chiason, of Henrietta, and J. P. Anderson, of Abilene, are members of the committee.

Seattle, Lake Shore & Eastern.—The track has been laid across the Pilchuck River and also on about 12 miles north of that point, to near the Skagit River. The bridge there is not completed, but trains will be run across by means of false work. It will be possible to run trains 10 miles north of Sedro as soon as the bridge is ready. The roadbed between the point 10 miles north of Skagit and south fork of the Nooksack will be finished as soon as the track can be laid, and there is nothing to delay the track to the boundary with the exception of two bridges over the south and north forks of the Nooksack, and a number of small trestles.

Spartanburg, Glendale & Clifton.—This company has recently been organized in South Carolina to build a road through Spartanburg west to Glendale and north to Clifton. It will be about 10 miles long. The three towns are at present on the Richmond & Danville.

Trenton Cut Off.—The work at the connection of this branch with the Pennsylvania at Glenloch, Pa., is being pushed rapidly forward. The contractors of the western section have over 50 teams and about 150 men at

work in Chester Valley. The stonemasons and bricklayers working on the undergraduate passenger tunnel at Glenloch have finished their work on that structure. This is said to be the largest brick arch undergraduate passenger tunnel on the line of the Pennsylvania road, and is wide enough for seven tracks.

Union Pacific.—What is known as the Shore Line has been definitely selected as the route from Tacoma to Seattle, Wash. It will be 39½ miles by this route from the station on the flat at Tacoma to Waller street, Seattle. The line will pass through the town of Des Moines, and will be in sight of the Sound all the way. Between Tacoma and Portland the force has been increased to over 2,000 men. More men are being put on as fast as they can be hired. The distance to Portland will be 149 miles.

Wabash.—The stockholders of the company will meet in St. Louis, Nov. 25, to vote on the question of constructing or acquiring a road now partly constructed from Montpelier, O., to the Indiana state line; and of extending the road through the state of Indiana to a connection with the tracks of the Chicago & Western Indiana road at Hammond, Ind.; also of issuing bonds to the amount of \$3,500,000, to be used in the construction and equipment of the line. The plan has been approved by the directors of the company.

Westerly & Jewett City.—A second survey is to be made for this road as soon as the committee which has the matter in charge secures the services of a chief engineer. The committee is in correspondence on the subject, and desires to hear from engineers willing to take charge of the survey. One survey has already been made between Westerly, R. I., and Jewett City, Conn., but it is thought that a better route can be secured by another survey. The road will connect with the New York & New England at one end, and with the New York, Providence & Boston at the northern terminus. The line will be 20 or 28 miles long. After leaving Westerly the road will pass through the towns of White Rock, Potter's Hill, Ashaway, Clark's Falls, Hopkinton City, Canonchet and Rockville, R. I., and Voluntown, Glasgo, Hopeville, Jewett City and Lisbon Station, in Connecticut. Between Clark's Falls and Voluntown another survey will be made via Laurel Glen and Pendleton Hill. It is also proposed to survey from near Glasgow to Pendleton, Conn., to decide whether that would be a better point for the terminus than Lisbon. A charter for the route has been obtained in Rhode Island, but one for the Connecticut section has not yet been applied for. The charter is held by T. H. Peabody, one of the executive committee.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—Vice-President Reinhart, who generally has something of interest to say about his road to the newspapers, gave a long interview last week, which we slightly condense: "I have previously said that the Atchison road was not a grain-carrying road and is not dependent upon any one section for its business. Our business has steadily kept up since we consolidated our lines in all the different sections, and in this connection I will give you an idea of what the cotton roads of our system are doing."

"The gross earnings for August, 1889, increased over 1888 17 per cent., and the month of August, 1890, increased over 1889 18 per cent. This prosperity is participated in by all of the Southwestern lines, and the cotton crop in Texas, which last year was valued at \$80,000,000, this year will be 20 per cent. larger. The new Southwestern Railway & Steamship Association agreement, participated in by the Southern Pacific, Missouri Pacific and Atchison, provides that the affairs of the association shall be directed by an executive committee of five, and that no changes in rates shall be made without the unanimous approval of this committee. The agreement will unquestionably maintain rates. You must know that it is of as much interest to Messrs. Gould and Huntington that the Atchison company should be prosperous as it is to the other stockholders. Both of these gentlemen own large blocks of Atchison stock, which they obtained through their exchange of St. Louis & San Francisco stock." Referring to the recent reports that the Atchison had purchased two of the Colorado and Utah roads, Mr. Reinhart commented: "The Atchison directors have not met since Aug. 5, and will not meet again until late in October."

Boston & Albany.—At the annual meeting in Boston last week the proposition to increase the capital stock of the company, under the authority of the Legislature, by the issue of 50,000 new shares of the par value of \$100 each, so that the capital shall be \$25,000,000, was adopted by a vote of 27,638 shares.

Canadian Pacific.—For the first time in nearly two years the weekly earnings of the road last week showed a decrease, the figures being \$365,000 against \$381,000, a falling off of \$16,000. This is said to be owing to the fact that last year there was a heavy movement of crops during the second and third week of September, as against little or nothing this year. In fact most of the crops last year were at Port Arthur before the close of navigation. This year a great portion of it will have to be moved during the winter.

Chicago & Erie.—The Circuit Court at Wabash, Ind., has issued, on application of the Wabash Co., an injunction restraining and prohibiting the Chicago & Erie from interfering with the running of the trains of the Wabash over the tracks of the Chicago & Atlantic road between Laketon and Hammond, Ind.

Chicago, Rock Island & Pacific.—Suit for \$200,000 damages has been brought on behalf of the United States government in the United States Circuit Court against this company. The suit is for tolls on 100,000 cars carrying freight over the Government Mississippi River Bridge from Rock Island, Ill., to Davenport, Ia., and covers a period from March 3, 1881, to Sept. 24, 1890. Included in this case are the tolls collected from the Chicago, Burlington & Quincy road, the Rock Island & Peoria, the Rock Island & Mercer and the Chicago, Milwaukee & St. Paul. It is said that 50,000 cars were carried for these companies at the rate of \$3 per car.

Cincinnati, Hamilton & Dayton.—The long pending suit of the stockholders of the company against W. R. McKean, President of the St. Louis, Vandalia & Terre Haute, for \$880,500, paid to him by Henry S. Ives for the latter road, when the "Ives-Staynor deal" was made, has been reported upon by the Master in Chancery, at Indianapolis, who holds that McKean cannot be compelled to give up the money that he received.

Fitchburg.—The agreement for the consolidation of the Cheshire road was voted on at the recent annual meeting in Boston, and ratified by a vote of 69,112 to 28 shares. The road has passed under control of the company this week.

Illinois Central.—The following statement shows the earnings from traffic for the two months ending Aug. 31:

| | 1890. | 1889. | |
|----------------------------|-------------|-------------|--------------|
| Miles operated..... | 2,275 | 2,275 | |
| Gross earnings..... | \$2,321,719 | \$2,300,043 | I. \$21,676 |
| Oper. expen. and taxes ... | 1,675,067 | 1,373,530 | I. 301,537 |
| Net earnings..... | \$616,632 | \$926,513 | D. \$279,861 |

The Dubuque & Sioux City Railroad Company reports its gross and net income for the two months to Aug. 31 as follows:

| | Cedar Falls | | Both roads | | |
|----------------------------|-------------|-----------|------------|----------|-----------|
| | D. & S. C. | Minn. | 1890. | 1889. | |
| Miles..... | 1890. | 1889. | 1890. | 1889. | |
| 524 | 524 | 76 | 76 | 60 | 600 |
| Gross earn. | \$325,665 | \$279,465 | \$17,265 | \$15,507 | \$342,930 |
| Oper. exp. and taxes. | 267,279 | 220,614 | 23,767 | 17,642 | 291,046 |
| Net earn. | \$58,386 | \$58,851 | { def. | { def. | \$51,884 |
| | | | \$6,502 | \$2,135 | \$56,716 |

Louisville & Nashville.—The annual meeting of the stockholders of the road was held in Louisville, Sept. 30. The annual report showed that the earnings of the road had been sufficient to pay six per cent. in dividends and the interest on the trust 6s to June 1 of this year and leave a surplus of \$430,000. The six per cent. dividends were paid in cash and scrip, and included three per cent. on \$35,000,000 capital in February last and three per cent. on \$48,000,000 in August. It is stated that hereafter the company will pay five per cent. dividends in cash. The gross earnings were \$18,846,000; net earnings, \$7,422,911; net surplus, \$461,274. The percentage of expenses to earnings is 60%, nearly 2 per cent. less than last year. During the year 1,750 cars have been built or purchased. The number of passengers carried was 5,193,630, an increase of 859,455. The freight tonnage increased from 1,077,221,842 to 1,250,836,794. Second tracks have been laid from Louisville to Anchorage, Louisville to Shepherdsville, Nashville to Edgefield Junction and Oxmor to Birmingham—in all 48 miles. The construction of a track from South Louisville to East Louisville, three miles, has been authorized. The capital stock has been increased from \$13,000,000 to \$48,000,000, and the increase sold for \$11,050,000 net, which was applied to the retirement of \$10,000,000 of bonds.

New Orleans & Gulf.—The sale of the road, now in the hands of a receiver, which was to have taken place last week, was deferred for two months, but the postponement may be made indefinite, as arrangements have been about completed with the bondholders and the Central Trust Co., of New York, for reorganization without foreclosure.

New Orleans & Northeastern.—The annual report for the year ending June 30 gives the gross earnings as \$1,219,730, an increase of \$240,451; operating expenses were \$878,025, an increase of \$77,970; net earnings \$340,805, an increase of \$162,480; fixed and other payments chargeable against revenue, \$355,952, an increase of \$9,650; net deficit, \$15,147, a decrease of \$152,830. The plan determined upon for the filling of the southern approach to the Lake Pontchartrain trestle includes the filling of two miles of trestle, beginning about one-half mile east of People's Avenue, in New Orleans, and running eastwardly, the material to be excavated close by. This work was let to contract in February, and would have been completed but for the exceptional rise of the Mississippi River in March, which caused a crevasse about 70 miles above New Orleans, through which the water made its way into Lake Pontchartrain and caused the lake to overflow the marsh. The contractors will, however, resume work as soon as the water will permit. The balance of the southern approach, about 11 miles in length, will be filled by a dredgeboat of the elevator type, which will discharge the material by means of a belt conveyor at a distance of 90 ft. from the centre of the hull, which will permit a berme 40 ft. wide between the foot of the new embankment and the canal cut by the dredge. A contract for the building of this dredgeboat was made on April 4, and it is expected that the work of filling the trestle will commence this month.

New York Central & Hudson River.—The following statement of the earnings and operating expenses of the company and its leased lines has been issued (the earnings for 1890 are partly estimated) for the quarter ending Sept. 30:

| | 1890. | 1889. | |
|--------------------------|-------------|-------------|--------------|
| Gross earn. | \$9,130,000 | \$9,745,202 | D. \$615,202 |
| Oper. expen. | 6,254,674 | 6,373,182 | D. 119,508 |
| P. c. exp. to earn | 68.51 | 65.40 | D. |
| Net earnings..... | \$2,875,326 | \$3,372,020 | D. \$496,694 |
| Fixed charges..... | 2,082,000 | 1,978,281 | D. 103,719 |
| Profit..... | \$793,326 | \$1,393,739 | D. \$600,413 |
| Dividend..... | 89,123 | 1,341,425 | D. 447,142 |
| Deficiency..... | \$100,957 | \$1,370,314 | I. \$48,633 |

Year to Sept. 30:

| | 1890. | 1889. | |
|--------------------------|--------------|--------------|--------------|
| Gross earn. | \$36,393,202 | \$35,696,236 | I. \$696,966 |
| Oper. expen. | 24,273,623 | 23,710,544 | I. 663,079 |
| P. c. exp. to earn | 66.97 | 66.42 | D. |
| Net earn. | \$12,019,579 | \$11,985,692 | I. \$33,887 |
| Fixed charges..... | 7,957,530 | 7,808,000 | I. 89,470 |
| Profit..... | \$4,062,049 | \$4,117,632 | D. \$55,533 |
| Dividend..... | 3,577,132 | 4,024,273 | D. 47,141 |
| Surplus..... | \$181,917 | \$93,339 | I. \$89,558 |

The report of the directors is for the nine months to June 30. The total of the construction account now stands at \$150,278,885. Since the last report the Niagara Bridge & Canandaigua and Geneva & Lyons roads have been merged into the New York Central at a cost of \$1,000,000 and \$331,580 respectively, which amounts have been charged to the cost of road. The account has also been increased by the following amounts, which have been expended for new construction: \$121,689 for land, \$148,520 for grading, etc.; \$26,577 for a new passenger station at Canandaigua, and \$25,877 on account of the new third track between Sputney Duyvill and Sing Sing. The capital stock is \$89,425,300 and the funded debt \$59,183,333. During the nine months the gross earnings were \$27,263,202, an increase of \$1,312,167; the operating expenses were \$18,118,948, an increase of \$781,586. The net earnings were \$9,144,253, an increase of \$530,580; the fixed charges were \$6,875,530, a decrease of \$14,249; the profit was \$3,268,723, an increase of \$544,890; the surplus was \$88,874, an increase of \$544,880. Of the earnings for the nine months,

\$17,161,840 were from freight, \$7,416,406 from passengers and \$1,268,883 from rents. The interest on bonds was \$2,084,628 and rent of leased lines, \$3,045,975. The passenger train mileage was 7,333,042 and freight train mileage 9,268,473. The number of through passengers was 150,388, and of way passengers was 12,905,000. There were 376,004,454 passengers carried one mile. The total number of tons of through freight was 1,729,001 and of tons of way freight 10,472,445.

New York, Lake Erie & Western.—The following statement shows the earnings and expenses of the system for August and the eleven months to Sept. 1:

Month of August:

1890. 1889. Inc.

Gross earnings..... \$2,798,618 \$2,775,706 \$19,910

Oper. expenses..... 1,703,384 1,694,824 8,780

Less proportions due leased lines..... 254,384 218,860 5,524

Net earnings..... \$840,850 \$835,224 \$5,626

Eleven months, Oct. 1 to Sept. 1:

1890. 1889. Inc.

Gross earnings..... \$26,499,152 \$24,478,147 \$2,021,006

Oper. expenses..... 17,234,567 15,882,557 1,402,010

Less proportions due leased lines..... 2,372,180 2,175,572 196,616

Net earnings..... \$6,842,396 \$6,420,018 422,380

and this in spite of the fact that it has been dividing traffic with its Western competitors for nearly a month.

The Lake Shore and the Michigan Central are still suffering from the effects of the shippers' bill of lading boycott. The Grand Trunk and Wabash made time contracts with the shippers while they were filled with indignation over the action of the other roads.

Traffic Notes

The Lake Superior Car Service Association went into effect at Duluth Oct. 1.

The North Dakota Railroad Commissioners have prepared regulations for the distribution of cars to grain shippers.

A statement of earnings of the Central New England & Western says that traffic over the Poughkeepsie bridge is increasing at the rate of 30 per cent. a month.

Scarcity of cars is now reported at several places. Box cars are in demand at a number of Western grain shipping points, and coal and coke cars are scarce at Pittsburgh.

A meeting of the National Association of Car Service Managers was held in Buffalo Sept. 24. The discussion was largely informal and referred principally to clerical matters.

Ocean freight rates have taken a sharp advance in consequence of the large amount of merchandise which is being shipped from Europe in anticipation of the change in the tariff laws.

Interstate Commerce Commissioner Veazey has been hearing complaints at Salt Lake, Utah. Consignees there complain of discrimination against them as compared with through shipments to the Pacific coast.

The propriety and even necessity of varying the rate for demurrage on freight cars is illustrated by the recent action of the Northern Pacific and Great Northern roads, which have notified grain shippers that empty cars set for loading will cost \$3 a day after 24 hours.

Southwestern Steamship & Railway Association.

The organization of this association has been practically completed; the members are the Texas Pacific; Missouri Pacific; Southern Pacific; Atchison, Topeka & Santa Fe; St. Louis & San Franc'co; Missouri, Kansas & Texas; New York & Texas Steamship Co.; Cromwell Steamship Co.; St. Louis, Arkansas & Texas; Kansas City, Fort Scott & Memphis.

The first article of the agreement provides that the association shall cover all interstate traffic having its origin or destination at points where there is competition between the members, and does not cover or relate to any traffic which begins or ends within the limits of any state disconnected from continuous transportation through or into other states. This paragraph is believed to fully comply with the Texas anti-trust law.

The second article names the following Executive Committee, who are to serve for one year from Sept. 1, 1890: S. H. Clark, J. C. Stubbs, J. Waldo, J. D. Springer and Robert Mallory. All action of the Rate Committee shall be subject to review and approval by the Executive Committee, and no change in the rates shall be published till thus approved.

The General Freight Agents shall constitute the Rate Committee; said committee shall make all rates and divisions, except division of rates between members of the association. The unanimous vote of all members shall be requisite to the adoption of any proposition involving revenue. It is a fundamental principle of the agreement that the Receiver, President, Vice-President or General Managers, whose names are affixed will assume the responsibilities, as the executive officers of their respective companies, for the maintenance of the provisions of this agreement by all officers and agents of their respective companies or transportation lines with which they have traffic arrangements. It will be seen that the rate-making power is vested in an Executive Committee composed of the highest officers of the companies interested.

National Transportation Association.

This is the name of the shippers' organization several times referred to in these columns. It was organized at a meeting in Chicago last week of delegates from the Boards of Trade of 14 prominent cities. The officers elected were: President, R. C. Grier, of Peoria; Vice-President, A. J. Van Landingham, of Kansas City; Secretary, George F. Stone, of Chicago; Treasurer, F. N. Magdeburg, of Milwaukee; Executive Committee, D. W. Ranlett, of Boston; E. P. Wilson, of Cincinnati; C. H. Graves, of Duluth; George Clark, of Chicago, and H. G. Craft, of St. Louis. Mr. Stone's election as Secretary doubtless fixes the headquarters in Chicago. As before stated, the object of the association is to foster the interests of shippers in dealings with railroads.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Sept. 27, amounted to 72,584 tons, against 70,658 tons during the preceding week, an increase of 1,926 tons, and against 58,912 tons during the corresponding week of 1889, an increase of 13,672 tons. The proportions carried by each road were:

| | W'k to Sept. 27 | | | |
|----------------------------------|-----------------|-------|--------|-------|
| | Tons. | P. c. | Tons. | P. c. |
| Michigan Central..... | 8,152 | 11.0 | 7,434 | 10.5 |
| Wabash..... | 2,938 | 4.1 | 3,603 | 5.1 |
| Lake Shore & Michigan South..... | 11,080 | 15.3 | 12,065 | 17.1 |
| Pitts., Ft. Wayne & Chicago..... | 8,371 | 11.6 | 7,123 | 10.1 |
| Chicago, St. Louis & Pitts..... | 10,571 | 14.6 | 11,225 | 15.9 |
| Baltimore & Ohio..... | 4,731 | 6.5 | 4,161 | 5.9 |
| Chicago & Grand Trunk..... | 7,986 | 11.0 | 9,165 | 12.9 |
| New York, Chic. & St. Louis..... | 7,700 | 10.6 | 8,050 | 11.4 |
| Chicago & Atlantic..... | 11,055 | 15.3 | 7,832 | 11.1 |
| Total..... | 72,584 | 100.0 | 70,638 | 100.0 |

Of the above shipments 2,074 tons were flour, 26,167 tons grain, 2,833 tons millstuffs, 6,885 tons cured meats, 2,201 tons lard, 8,805 tons dressed beef, 1,539 tons butter, 1,337 tons hides, 232 tons wool, and 10,060 tons lumber. The three Vanderbilt lines carried 36.9 per cent., while the two Pennsylvania lines carried 26.2 per cent. of all the business.

During the week the lake lines carried 65,658 tons, against 87,597 tons during the preceding week. Of the shipments 3,938 tons were flour and 57,155 tons grain.